National Cotton Council OF AMERICA
1521 New Hampshire Avenue, N.W.
Washington, DC 20036
(202) 745-7805 • FAX (202) 483-4040
www.cotton.org

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April 20, 2018

Office of Pesticide Programs
Regulatory Public Docket (7502P)
U.S. Environmental Protection Agency
One Potomac Yard (South Building)
2777 S. Crystal Drive
Arlington, VA 22202

**RE: Docket No. EPA-HQ-OPP-2011-0865**

The National Cotton Council (NCC) appreciates this opportunity to provide comments on the Environmental Protection Agency's (EPA's) "Registration Review; Neonicotinoid Risk Assessments; Neonicotinoid Benefits Assessments; Notice of Availability." The NCC appreciates the EPA's compliance with the Food Quality Protection Act (FQPA) and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and acknowledges the many accomplishments of the EPA that have resulted in enhancing the safety of U.S. food and fiber production for consumers. The NCC does not believe the general public fully understands the exacting measures employed by EPA to assure crop protection products, used as labeled, continue to provide the public with affordable, safe food and fiber. The NCC has reviewed the supporting documents EPA has drafted for the neonicotinoid Clothianidin, and urges EPA to highlight the unique mode of action (MOA) with no issues or concerns for human health. The NCC urges EPA to recognize that this unique MOA has provided cotton producers an additional tool to enhance Integrated Pest Management (IPM) programs and Insect Resistance Management (IRM) programs, while preserving or enhancing human safety--a benefit that is seldom acknowledged.

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 9 and 12 million acres of cotton, with production averaging 12 to 18 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 125,000 workers and produce direct business revenue of more than $21 billion. Annual cotton production is valued at more than $5.5 billion at the farm gate, the point at which the producer markets the crop. Accounting for the ripple effect of cotton through the broader economy, direct and indirect employment surpasses 280,000 workers with economic activity of almost $100 billion. In addition to the cotton fiber, cottonseed products are used for livestock feed and cottonseed oil are used as an ingredient in food products, as well as being a premium cooking oil.

The NCC believes the EPA's Human Health Risk Assessment, although overly rigorous, clearly shows the labeled uses of this product are safe. The NCC urges EPA to acknowledge the human health safety of this product in its benefits consideration.

The NCC believes the EPA's Preliminary Aquatic and Non-pollinator Terrestrial Risk Assessment is overly conservative and should be refined to more appropriately reflect current planting rates and the advanced precision of modern planting equipment. The NCC disagrees with EPA's assumption that much of the planted cotton seed are above ground and available for birds.

The NCC urges EPA to have a better understanding of the dramatic changes in cotton production in the past 10 to 15 years, with the increased cost of seed being one of most significant of these. Advanced technology such as seed treatments of fungicides and insecticides, plant incorporated protectants, advanced germplasm research that improves both yield and quality, and herbicide tolerance traits have changed the cost of a bag of seed from being a minor cost to being a major economic consideration. Producers quickly realize that much of their production costs have shifted from mid or late season periods to the planting period, thus adding expenses at planting before any expectations of crop and environmental potentials are realized. The increased "at-planting" costs for cotton quickly gained producers attention to all planting details. Producers seek production practices that minimize planting rates while ensuring an adequate plant stand. Advancements in planting equipment provide enhanced accuracy of planting depth and planting rate, as well as providing monitors to warn drivers of issues with any individual row device.

The NCC does not agree with EPA's preliminary risk assessment. The risk estimates used in the analysis for cotton assumes a planting rate (Table 2-28) of 85,000 seed per acre. This rate apparently is derived from EPA's Memorandum (finalized March 24, 2011, Product Review Panel date 10 November 2010) with the subject "Acres Planted per Day and Seedling Rates of Crops Grown in the United States." The planting rate extreme of 85,000 seed per acre was only referenced in California (Table 6) and is a small exception in less than 25% of the acreage of California itself (R. B. Hutmacher, University of California Davis, personal communication March 29, 2018). In 2017, approximately 12,600,000 acres were planted to cotton in the U.S.. Approximately 303,000 were planted in California. If less than 25% (75,750) of California's acreage utilized the extreme of 85,000 seed per acre, that is less than 0.61 percent of total U.S. cotton acreage. The use of the extreme seeding rate in some areas of California is a particular circumstance that does not reflect U.S. cotton production practices. It is our understanding that the areas that occasionally use this practice are those with high salinity soils (therefore expectation of high seedling mortality) and primarily in pima cotton production. Pima cotton requires a longer growing season and in these areas, producers have only one chance to get a stand. The vast majority (99.9939%) of the U.S. cotton production system does not use this practice and cotton production should not be misrepresented by a practice used on such small amount of acreage.

EPA's document "Acres Planted per Day and Seedling Rates of Crops Grown in the United States", had multiple references from states other than California (Table 6, page 13 and Table 10, page 25) reporting lower seeding rates. The 2017 Georgia Cotton Production Guide (http://www.ugacotton.com/vault/file/2017-Georgia-Cotton-Production-Guide.pdf ) provides more appropriate information on page 24, section on Plant Populations/Seeding Rates:

*"Because the "per acre" technology costs of transgenic varieties are directly linked to seeding rates, growers are often tempted to minimize the number of seed/ft. In research trials conducted from 1995 to 1997, rates as low as 2 seed/ft resulted in plant stands ranging from 1.2 to 1.9 plants/ft and maximum lint yield over the 3 year study. Practically, a target of 2.5 seed/ft is a reasonable trade-off for economizing with expensive transgenic cotton."*

Similar information is provided in North Carolina (https://content.ces.ncsu.edu/cotton-information/planting-decisions, page 21):

*"Optimum yields can be achieved with plant populations varying from two to four plants per foot (28,000 to 55,000 plants per acre on 38-inch rows)"*

The University of Arkansas (https://www.uaex.edu/farm-ranch/crops-commercial-horticulture/verification/2016_Arkansas_Cotton_Quick_Facts%20v003.pdf) provides similar plant density recommendations.

A report from research conducted in Texas --the state with the largest cotton production acreage-- (https://agfax.com/2018/03/05/texas-cotton-row-spacing-seeding-rates-focus-of-new-studies/) states:

*"Kimura planted her seeding rate trial in 2016 and 2017, with the most recent crop harvested Nov. 17. She said traditionally, cotton producers in the Rolling Plains plant 2-2.5 seeds per foot for dryland conditions and 3-4 seeds per foot in irrigated cotton.*

*The study was conducted to determine the best seeding rate for lint yield and values, comparing rates of 22,216, 44,431, 57,499 and 73,181 seeds per acre in 40-inch spacing, Kimura said.*

*"We found the lower seeding rates seemed to produce the same amount of lint yield under favorable environmental conditions," she said.*

*Over the two years, there were no differences among all seeding rates in the irrigated trial, but net dollars per acre were the highest at 22,216 seeds per acre in the dryland trial, Kimura said.*

*However, she cautioned, while the low seeding rates may perform as well as higher seeding rates, they may be more susceptible to harsh environments such as hail, sandstorms and dry conditions."*

The Cotton Specialist at Oklahoma State University (https://agfax.com/2017/04/21/oklahoma-cotton-planting-strategy-seeding-rate-root-rot-control/) stated:

"*However, because of the cost of transgenic varieties in addition to cost of premium insecticide/fungicide/nematicide seed treatments, many producers are pushing the agronomic minimum and living on the edge, with little margin for error, so to speak.*

*Many seeding rate trials have been conducted in southwestern Oklahoma and the Rolling and High Plains regions of Texas over the last several years. Results all point to the fact that* *seeding rates can be pushed to a lower level than what was generally accepted 10-15 years ago, however, the producer must have extreme faith in the planter and its adjustment, field-specific planting situation, seed quality, and environmental conditions after planting.*

*From a crop insurance perspective, it is difficult to agronomically justify less than 2 seeds/row-ft in 40-inch rows (about 26,000 seeds/acre) as a best management practice in dryland cotton production.*

*Cotton has a remarkable capacity to compensate yield across a fairly wide range of plant populations. Recent seeding rate studies have indicated that within the FINAL plant stand range of 1.5 to 4.5 plants per row-ft. in 40-inch rows, lint yield can remain reasonably unaffected. However, how a producer gets from a seed drop rate to a final plant stand can be a treacherous journey.*

*Assuming that good soil conditions are present, and an excellent vacuum planter is used to control seed distribution both down the row and in planting depth, a range of 2-4 seed per row-ft. in 40-inch rows (about 26,000 to 52,000 seeds/acre) is probably acceptable.*"

Clearly, EPA is basing the risk assessment on planting density that is essentially 2X of production practices as well as flawed assumptions of seed placement within the soil.

Additionally, it appears the risk assessment assumes cotton fields are covered in grasses and weeds that serve as the sole food source for birds and mammals. This unrealistic assessment ignores all weed management practices and does not reflect growing practices or the agro-eco system. One expert (Dr. Darrin Dodds, Mississippi State University, Assoc. Extension/Research Professor and Cotton Agronomist, personal communication, March 29, 2018) estimated the worse field regarding weed control is not likely to have more than 5% foraging plants available. The NCC urges EPA to more accurately reflect production practices and to recognize that the majority of the cotton fields of the U.S. are devoid of small grass seeds for birds, and certainly do not make up the entire diet source for birds. Emerging cotton seeds are not highly competitive, and weed control is essential to cotton production. A pre-plant weed control program removes weeds before planting, followed by at-planting or post planting residual herbicides and post emerge herbicides to maintain a weed free field. EPA is aware of these practices as recommended by the Weed Science Society of America (WSSA: https://www.cambridge.org/core/journals/weed-science/article/reducing-the-risks-of-herbicide-resistance-best-management-practices-and-recommendations/2E46792A8800CB7B292EB1AAAEA3ACE9 ).

The NCC again reminds EPA of the need to re-evaluate EPA's theoretical water model. EPA's theoretical water model indicates potential risks to aquatic insects. The model has over-estimated concentrations of pesticides in water multiple times compared to real-world monitoring data. EPA needs to seek improvements and identify a water model that can be validated by monitoring data. It is known that EPA Water Division's monitoring data and conclusion refuted the output of EPA's theoretical water model.

The NCC urges EPA to refine the Aquatic and Non-pollinator Terrestrial Risk Assessment to reflect the scientific data and modern production practices. The NCC urges EPA to recognize that producers continue to improve production efforts and practices, and if mitigations are necessary, stakeholders should be engaged early in the process to ensure mitigations are realistic and can be implemented.

Additionally, the NCC welcomes the opportunity to comment on EPA's "Benefits of Neonicotinoid Insecticide Use in the Pre-Bloom and Bloom Periods of Cotton." The NCC agrees with the EPA's pollinator risk assessments for neonicotinoids which reported that treated seed were not of concern. Even so, the NCC has partnered with the American Seed Trade Association (ASTA) and other groups to reinforce appropriate stewardship of treated seed. Additionally, the NCC is appreciative that USDA/EPA recognized the weight of science that cotton pollen is not attractive to bees and cotton nectar is attractive to bees only under certain conditions (https://www.ars.usda.gov/ARSUserFiles/OPMP/Attractiveness%20of%20Agriculture%20Crops%20to%20Pollinating%20Bees%20Report-FINAL_Web%20Version_Jan%203_2018.pdf ). The NCC agrees with EPA's Biological and Economic Analysis Division (BEAD) statement in recognition of the importance of neonicotinoids in cotton pest management programs, "*BEAD concludes that the benefits of neonicotinoids are high during the pre-bloom and bloom period for cotton*." The NCC is pleased to provide BEAD with additional points for consideration in the benefits assessment of neonicotinoids to the cotton industry.

The NCC continues its disagreement with EPA's pollinator risk assessment and conclusion that foliar neonicotinoid crop protection practices in cotton present high risk to honey bees. The NCC has provided research studies that show cotton is not a preferred food source for honey bees, but is utilized by honey bees only in times of limited food alternatives. Additionally, the NCC has provided data to EPA demonstrating that cotton 1) is self-pollinated, 2) has an extremely short duration of an individual flower being open (generally 3 days), and 3) has a flowering process which is staggered in a sequence (meaning few flowers per plant are open at a given time). The NCC also has provided EPA with studies in Arizona that placed high numbers of hives around a cotton field to attempt to achieve cross pollination, but the scientist reported that most of the honey bees left the cotton field area for desert flowers (McGregor 1959). The NCC continues its belief that while honey bees do utilize cotton nectar under some circumstances, EPA's pollinator risk assessment overestimates cotton's portion of the honey bee diet, ignores the diversity of the honey bee diet, assumes bees are present in cotton fields leading to potential exposure, and thereby overestimates the risk to honey bees. The NCC understands risk is based on both toxicity (hazard) and exposure (probability of contact). However, the risk assessments completed by the Agency force exposures and are overly conservative while lacking real-world validity.

The NCC appreciates the EPA's recognition of the variability of insect pest pressure between cotton production regions of the U.S., and hopes EPA also understands the variation between years within a region. The NCC notes an error in the EPA's use of the citation for cotton regions (Wrona et al., 1996) and notes that rather than identifying the "Plains: New Mexico, Kansas, Oklahoma, and Texas," the citation refers to the region as "Southwest: NM, OK, TX" with Kansas production being excluded.

The importance of variability of pest pressure between years directly impacts the number of crop protection treatments necessary and the assumptions that EPA makes regarding alternatives.

State university experts strive to address IRM with producers during a given crop year by attempting to limit repeated use of a single pesticide MOA while complying with maximum seasonal use requirements imposed on product labels. Every loss of a MOA, combined with additional restrictions on the maximum seasonal use of other MOAs, results in higher selection pressure for resistant pest development.

Similarly, the EPA states a consideration of reducing the rate of the neonicotinoids as a potential mitigation solution. Science has clearly shown that reducing the rate of pesticides to the minimum efficacy results in more rapid selection for resistant genotypes by allowing higher survival of heterozygous resistant genotypes. The NCC urges EPA to avoid rate reductions that would result in inadequate efficacy and/or increased selection for resistant pest genotypes.

The NCC additionally urges EPA to recognize that aerial application is critical to IPM practices. Cotton producers and their independent crop consultants manage large acreages and monitor the density of the pest populations twice each week of the growing season as recommended by their state extension experts. Once the pest population exceeds the pest density threshold, it is imperative to be able to quickly treat the acreage to prevent economic losses. Aerial application is critical to the timely treatment of large acreages. Today's aerial applications have adopted abundant technology to ensure safety of these applications that minimizes drift concerns of the past. The loss of aerial applications would likely force reevaluation of thresholds to account for timing delay of application, thus forcing producers to begin treatment at lower insect pest densities.

The NCC notes that Table 2, page 7, footnote 2 (Hutmacher et al. (2012)) is not an accurate statement for all gins, and suggests updating the estimated value of cottonseed/acre. In some areas, the value of cottonseed is not enough to cover ginning charges. Using average yields, USDA estimates for ginning cost per acre, and the current value of cottonseed, the shortfall is about $45 per acre. This has resulted in some producers paying an additional $24 to $40 per bale for ginning. The 2010-2014 data does not reflect gross revenue and costs of production in the past few years. The gross revenue and cost of production data should be updated to included 2015 – 2017 data. Cotton prices were abnormally high in 2010-2013 due to China's stocks policy. Prices from 2014-2017 have been much lower. Production costs are also higher than in 2010-2014.

**Alternatives**

EPA notes in the last paragraph on page 2, "Impacts arise due to growers using alternative insecticides for control of key cotton pests including plant bugs and stink bugs. BEAD concludes that most growers currently relying on neonicotinoids during the pre-bloom and bloom periods would switch to organophosphate and/or synthetic pyrethroid pesticides. These alternatives can likely be used in a manner to achieve similar control to neonicotinoids; thus, yield effects are not anticipated, but pest control costs are likely to increase. Given the capacity of synthetic pyrethroids to flare secondary pest outbreaks, the impacts of restricting neonicotinoids may be underestimated."

First, the NCC believes a critical flaw in the EPA's procedure to identify alternatives is the lack of transparency in reporting to the public EPA's current risk assessment of the identified alternatives. By stating one product has risk of concern but that there is an alternative product, EPA implies that the alternative product will be available and that the alternative product has less risk of concern. The NCC does not believe it is appropriate to make a claim of an alternative product if that claimed alternative product is currently under registration review and has similar or greater risk concerns. The cascading effect results in sequential restrictions on MOAs until there is no alternative and, therefore, no pest control available. The NCC asks the EPA to clarify if the stated alternatives have clearly demonstrated no concerns, including those relative to honey bees, for use during pre-bloom and blooming periods of cotton.

Second, the NCC believes EPA should evaluate alternatives based on the seasonal uses and on the pressures from all pests, not just the target pest of the neonicotinoids. The flaw in the EPA's present approach ignores other pest uses of pyrethroids and organophosphates that reduce the amount available to replace neonicotinoid applications without exceeding the seasonal maximum use and without consideration of IRM recommendations for rotation of MOA. Management systems for the entire cotton pest spectrum are complex and IRM for other pests could be compromised.

Third, the NCC disagrees with the EPA's statement that "yield effects are not anticipated." The NCC notes that the pyrethroid and organophosphate chemistries have a long history of multiple agricultural and urban uses. Unfortunately, scientists have documented multiple pests (some in isolated areas and some across broad areas) that have evolved resistance to these chemistries (citations and additional discussion below). Due to the lack of new insecticidal MOAs being registered, university scientists often recommend application of two MOAs in a single application when cross resistance has not been identified. Based upon the supporting science, the loss of a MOA would result in less efficacy (i.e., fewer damaging pests controlled) which will inevitably result in yield reduction.

Fourth, the NCC agrees with the EPA that "Given the capacity of synthetic pyrethroids to flare secondary pest outbreaks, the impacts of restricting neonicotinoids may be underestimated." University extension scientists monitor in-season pest pressure and, if needed, alter their recommendations to producers during a given production season. An example would be altering recommendations due to increased observations of a secondary pest with a goal to avoid flaring secondary pest outbreaks. Secondary pest outbreaks often result in costly repeated insecticide applications as well as yield impacts (Horton et al.2005, Dutcher 2007). Documentation of "flaring" secondary pest outbreaks is difficult (Hardin et al. 1995, Dutcher 2007), but has been demonstrated for mites and aphids (Hill et al. 2017), both of which are pests of concern for cotton production. Gross and Rosenheim (2011) analyzed pest-control practices for 969 cotton fields spanning nine years and 11 private ranches in California. They reported early-season broad-spectrum insecticide treatments for plant bugs was attributable for secondary pest outbreaks, accounting for 20% of late-season pesticide costs (estimated in 2010 to be an additional $6.00 per acre). These data would suggest that a reliance on the stated alternatives does underestimate the impact of restricting neonicotinoids because the evaluation does not account for flaring of secondary pests or the additional applications that are typically required to manage a scenario that has flared secondary pests.

## Aphids and Whiteflies

The NCC disagrees with EPA's interpretation of the UGA 2016 publication at the top of page 16. For the record, the entire context of the cited document states:

*"Aphid Management*

*Cotton aphid is a consistent and predictable pest of cotton in Georgia. Aphids will typically build to moderate to high numbers and eventually crash due to a naturally occurring fungus. This fungal epizootic typically occurs in late June or early July depending on location. Once the aphid fungus is detected in a field (gray fuzzy aphid cadavers) we would expect the aphid population to crash within a week.*

*Aphids feed on plant juices and secrete large amounts of "honeydew", a sugary liquid. The loss of moisture and nutrients by the plants has an adverse effect on growth and development. This stress factor can be reduced with the use of an aphid insecticide. However, research conducted in Georgia fails to consistently demonstrate a positive yield response to controlling aphids. Invariably, some fields probably would benefit from controlling aphids during some years. Prior to treatment, be sure there is no indication of the naturally occurring fungus in the field or immediate vicinity. Also consider the levels of stress plants are under, vigorous and healthy plants appear to tolerate more aphid damage than stressed plants."*

Additionally, on page 41 of the cited publication, aphids are listed as the pest in column one, with adjacent columns showing optional insecticides for aphid control, insecticide class for resistance management practices, and the last column states "*Apply when aphids are abundant and seedling leaves are severely curled or when "honeydew" is present in older cotton. A naturally occurring fungal disease often eliminates the need for sprays, but this epidemic occurs only after aphid population reach high levels and tends to be less effective late in the season."* The EPA's interpretation that the above citation which indicates, "Aphids are likely not primary targets of insecticide applications because aphids often build to moderate population size in cotton fields before crashing naturally due to a persistent fungal epizootic infection (UGA, 2016)," clearly is a misinterpretation of the publication.

The NCC would like to clarify that aphids and whiteflies are a concern in every cotton region, and are typically present but do not always reach treatment criteria. Many factors must be considered in aphid and whitefly management in each region. Drought stress, presence of honey dew, stage of the cotton crop, diversity and proximity of other crops (for example as row crops and vegetable crops in CA, AZ, and GA must consider resistance selection from each other) and many other factors (including reports of natural aphid fungus in some regions) complicate the decision to invest more money for aphid and/or whitefly control. For aphids, producers can wait for the fungal epizootic too long and suffer yield loss. At times, producers make the aphid treatment and the epizootic occurs within a few days. The producer's treatment decision is complex. Tremendous research efforts have attempted to develop cost savings for cotton producers by monitoring and alerting them of indications that the aphid fungal epizootic may occur (Steinkraus and Hollingsworth 1994, Hollingsworth et al. 1995, Steinkraus and Slaymaker 1994, Steinkraus et al. 2002). Unfortunately, aphid populations may occur at any stage of cotton production and the fungal epizootic is not always a reliable control, especially late season.

The NCC urges EPA to attain a better understanding of the economic impact of honey dew and "sticky cotton" resulting from aphids and whiteflies. The potential occurrence of sticky cotton is a severe concern to the entire cotton industry production and marketing chain. The EPA commented that the silverleaf whitefly is a pest that only sporadically reaches damaging levels of concerns. The NCC believes the EPA does not recognize the potential impact of sticky cotton for producers who do not have the tools to manage aphids and whiteflies. The rapid population increase (sometimes at a field level or area level; sometimes at a larger level) and the stage of plant development can result in honeydew on lint, termed "sticky cotton." Henneberry et al. 2001 (http://arizona.openrepository.com/arizona/handle/10150/211301 ) showed the association of aphids and honeydew resulting in sticky lint. Hector and Hodkinson (1989) reported over 80% of sticky cotton at textile mills was associated with aphids and whiteflies.

The research literature has numerous papers discussing the challenges to control aphid and whitefly outbreaks, and the extreme need for multiple MOAs in rotation to avoid uncontrollable populations (Hequet et al., 2007, Sticky Cotton: Causes, Effects, and Prevention, USDA ARS Tech. Bull. No. 1915, 210pp; Nichols et. al. Management of White Fly Resistance to Key Insecticide in Arizona (http://www.cottoninc.com/fiber/AgriculturalDisciplines/Entomology/Whitefly/WhiteFlyResistance/;Whiteflies:%20Cotton%20Insect%20Management%20Guide), (https://cottonbugs.tamu.edu/foliage-feeding-pests/whiteflies/). The biology and rapid population growth of aphids and whiteflies requires the availability of critical IRM tools. The loss of neonicotinoids could force additional applications of other MOAs that would not provide the control benefits and would limit producer's availability to rotate MOAs. Ellsworth et al. (1999, The University of Arizona, Cooperative Extension IPM Series No. 13, Sticky Cotton Sources & Solutions) reported, "*insecticide treatment to specifically prevent stickiness has cost Southwestern cotton growers $47 million for aphids and $154 million for whiteflies from 1994-1998.*" The development and implementation of a new integrated system of whitefly management greatly reduced the cost, but optional management tools must remain available to comply with IRM recommendations.

Aphids and whiteflies do more than just reduce yield. The sugars they excrete impact the entire cotton chain – from producer yield losses, slowing ginning process by up to 25% (Ellsworth et al., 1999), lowering grade and value $0.03/lb – $0.05/lb (Ellsworth et al. 1999), requiring additional costs to spin fibers, requiring frequent shutdown of processing equipment to clean gumming of sugars, and potential reduction in the quality of the final product due to staining and fiber grade. The seriousness of sticky cotton can impact entire regions as textile mills attempt to avoid the purchase of sticky cotton.

Aphids also present a problem in scouting for caterpillar eggs and neonate larvae. When aphid populations reach a density that begins to show the shiny leaves (honeydew), it is difficult to determine the number of aphids present. A mere walk through the field can cover one's clothes with gummy residue from thousands of aphids brushed from the underside of leaves. The terminal of the cotton plant will most often be covered with aphids making it practically impossible for professional crop consultants to monitor for bollworm/budworm larvae. Often the producer/crop consultant will make a control treatment for aphids, not just for the concerns raised above, but also in fear of greater losses resulting from inability to monitor for bollworm/budworm eggs and larvae. Although the NCC does not agree that neonicotinoids have direct mortality for bollworms, the NCC believes the data confusion is likely due to premixes that are recommended when multiple pests are present in a cotton field (see premixes for multiple pests, page 16, https://extension.tennessee.edu/publications/Documents/PB1768.pdf).

**Thrips, Lygus and Stinkbugs**

In 2016, lygus, stink bugs, and thrips (Williams, 2016) were ranked the top three cotton insect pests in the U.S. Although there are geographical differences in species composition, taken collectively, these sucking insects have become the dominant pests of U.S. cotton for several years.

Thrips typically move into cotton fields early season, often shortly after germination of cotton seedlings. In general, neonicotinoid seed treatments have shown to greatly decrease the need for foliar control of thrips. Environmental factors (for example cool temperatures that delay the cotton plant growth thereby extending the period of time the plant remains susceptible to thrips injury) and some reports of thrips resistance to particular seed treatments require continued monitoring of seedling cotton for thrips and the ability, if needed, for foliar control applications. In the absence of effective, at-plant systemic insecticides at planting, thrips would be a greater pest threat and more difficult to control.

Lygus (plant bugs) and stink bugs are highly mobile adults that feed on numerous alternative plant hosts and often move into fields from native vegetation near the cotton fields. The movement can occur throughout the cotton growing season, and may require multiple applications during one growing season. Selection of an insecticide product targeting these pests MUST consider the species complex, previous history of the area, and any previous MOAs application.

Lygus hesperus is more common in the western growing region of the U.S., while Lygus lineolaris is more common in the midsouth and southeast growing regions. Leigh et al. (1977) documented organophosphate resistance in L. hesperus in California. Cleveland and Furr (1980) documented L. lineolaris resistant to organophosphates in Mississippi. During a similar time, Schuster et al. (1987) reported L. lineolaris control failures in Texas. Snodgrass and Scott (1988) documented variation in resistance levels to dimethoate based on time of year and location, but reported little tolerance of L. lineolaris to acephate. Studies have continued to monitor the development of Lygus resistance to organophosphates, pyrethroids and other chemistries with much documentation demonstrating Lygus tolerance to the multiple chemistries and with variation during a given year and/or location (Parys et al., 2017, Luttrell et al. 2018). Because of the variation of Lygus resistance to multiple MOAs, many university extension scientists recommend tank mixing of MOAs for resistance management purposes. However, each tank mixing application often increases the cost of the application and reduces the amount of two MOAs that can be used for the remainder of the season due to label restrictions. Luttrell et al. (2018) reported that total foliar sprays for plant bugs in the midsouth region ranged from 3.4 to 5.8 applications per year (2008-2015). Considering that at least some of these applications were tank mixes with more than one MOA, the cost per application increases. These points illustrate the importance of multiple MOAs for resistance management purposes and for control of damaging cotton pests. Additionally, the above points illustrate the critical importance of taking the entire growing season into account rather than a snap shot view. One cannot simply conclude that pyrethroids and organophosphates are alternatives. The recommendations by local university extension specialists and the producer's pest management strategies must have flexibility to adapt to variation in effectiveness of control strategies and thereby must have multiple tools available to make necessary adjustments. However, the benefits analysis fails to incorporate the need for multiple MOA's and fails to recognize yield loss due to documented resistance of products the EPA has identified as alternatives. The identified alternatives are already incorporated into the seasonal management strategies. Restrictions on the neonicotinoids would result in a greater reliance on the organophosphates and pyrethroids which, based on history, would likely result in control failures due to a rapid increase in resistant genotypes.

The NCC notes that while control of L. lineolaris populations has been a greater challenge in the midsouth region, similar experiences have been reported in recent years for parts of the southeast region, particularly North Carolina (Dominic Reisig, North Carolina Cooperative Extension Service Entomologist, personal communication).

There are multiple species of stink bugs that may infest cotton, and brown stink bugs require different management strategies than other stink bug species (https://cottonbugs.tamu.edu/fruit-feeding-pests/stinkbugs/ ). However, if there is more than one species present in the field, the selection of control products becomes more difficult. The presence of multiple pests (for example bollworms, moderate aphid pressure, and stink bugs) adds to the complexity of the producer's pest control decisions. Add to that pest control applications made previously during the growing season, and the producer is limited on remaining available pest control options (either due to IRM strategies or in compliance with label restrictions that limit amount of product per year or period).

The NCC believes that although EPA BEAD "*concludes that the benefits of neonicotinoids are high during the pre-bloom and bloom period for cotton*," EPA has greatly underestimated the benefits, has not shown transparency regarding the status of identified alternatives, and has underestimated yield loss that would result from the restrictions (whether rate, application method, or use period).

The NCC urges EPA to refine the benefits analysis, and make sure that stakeholders are engaged early in any discussions of mitigation in order to clearly identify effective and meaningful mitigation that can be implemented at the field level without resulting in unintended outcomes.

The NCC appreciates the opportunity to provide these comments in response to EPA notice "Registration Review; Neonicotinoid Risk Assessments; Neonicotinoid Benefits Assessments; Notice of Availability."

Sincerely,

Steve Hensley
Senior Scientist, Regulatory and Environmental Issues
National Cotton Council

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