TO: Environmental Protection Agency

ATTN: Dr. Yu Ting Guilaran

FROM: National Cotton States Arthropod Pest Management Working Group

RE: Docket ID EPA-HQ-OPP-2008-0915

Acephate Risk Assessment, Case Number 0042

Dear Dr. Guilaran:

The National Cotton States Arthropod Pest Management Working Group (NCSAPMWG, https://southernpests.org/) is a collaboration of 35-45 entomologists from land-grant universities specializing in management of arthropod pests of cotton, corn, soybean, grain sorghum, and wheat in all cotton producing states from California to Virginia. Originally, the group convened for the first meeting in 1978 in Orlando, FL, and was called the "1978 National Cotton Pest Management Seminar." The NCSAPMWG has recently been recognized by the Southern and Western Region IPM Centers as an official working group.

We would like to thank the U.S. Environmental Protection Agency (EPA) for the opportunity to comment and provide information on Docket EPA-HQ-OPP-2008-0915, "Pesticide Registration Review, Acephate Risk Assessment, Case Number 0042". We are the public sector scientists who have responsibility for directly developing, delivering and helping implement the science that supports practitioners of Integrated Pest Management (IPM) for insect pests of agronomic crops grown in our regions. Historically, acephate has been an important insecticide for IPM programs in cotton and soybean across the cotton belt. However, there are significant differences among the different regions of the U.S. in terms of realistic use patterns that we would like to highlight.

Cotton

In general, acephate is the most important insecticide for tobacco thrips (*Frankliniella fusca*) control across most of the country in cotton. It is used as a supplemental seed treatment or in-furrow spray in many areas where neonicotinoid resistance has occurred. Additionally, one to two foliar applications are often needed to control thrips in cotton.

In the far western U.S. (New Mexico, Arizona, and California), acephate is rarely used for insect pest control in cotton. Based on surveys, it accounts for less than 2% of the sprays for *Lygus hesperus* and is only used at the highest labeled rate (1.0 lb /A). It is also occasionally used as a cheap, very late season synergist to overcome pyrethroid resistance in whiteflies and minimize risks of whitefly honeydew. A small number of growers make us of it as the only chemical control for the brown stink bug (*Euschistus servus*). As a result, use of acephate in the western U.S. is very

limited, but still important where those uses are necessary and especially when other alternatives have already been used (e.g., to support resistance management). Notably, Arizona applies most insecticides, especially late season ones and including acephate, by aerial application.

In Texas, acephate needs and subsequent uses are highly variable across the different cotton production regions. Depending on region, the primary targets include thrips species, cotton fleahopper (*Pseudatomoscelis seriatus*), *Lygus* spp., and stink bug species (Hemiptera: Pentatomidae). The potential number of sprays range from 2 to 5 applications depending on location. The rates are generally lower than the highest labelled rates, except for the occasional stink bug application resulting in the maximum seasonal use ranging from 1.5 to 2.5 lbs ai/A.

In the southeastern states that include Alabama, Georgia, South Carolina, North Carolina, and Virginia, acephate is important for the control of tobacco thrips, stink bug species (Hemiptera: Pentatomidae) and tarnished plant bug (*Lygus lineolaris*). Generally, cotton producers in the southeastern region use acephate as a seed treatment at approximately 0.036 lb ai/A or as an in-furrow spray at 0.97 lb ai/A. That application may be followed by one foliar application for thrips at 0.18 to 0.36 lb ai/A at the first true leaf stage (approximately 10-12 days after planting). An additional foliar spray (and occasionally two) is usually made during the third to fifth week of flowering to control tarnished plant bug and/or stink bugs (76 Days to 90 Days after planting). Total use in the southeastern U.S. will typically be around 1.11 lb ai/A, but may occasionally approach 3.0 lbs ai/A under extreme plant bug and stink bug pressure.

By far, the greatest use of acephate in cotton occurs in the midsouthern states of Louisiana, Mississippi, Arkansas, Tennessee, and Missouri. Use of acephate for thrips control in this region is similar to that in the southeastern U.S. However, the primary pest of cotton in the midsouth region is the tarnished plant bug and multiple sprays are often needed to control this pest, especially in Delta regions. A small percentage of the acreage in this region may require the maximum seasonal use rate of 4.0 lbs ai/A in any given year. The greatest use typically occurs during the flowering period approximately 60 to 112 days after planting. Many fields will receive up to three applications in this window.

Soybean

Similar to cotton, the reliance on acephate for IPM programs in soybean varies greatly across the southern U.S. In general, soybean is a relatively minor crop west of Arkansas and Louisiana. The primary use of acephate in soybean is to control stink bug species. Brown stink bug (*Euschistus servus*), green stink bug (*Acrosternum hilare*), and southern green stink bug (*Nezara viridula*) are the most common and widely distributed stink bug species found in soybean. However, two invasive species, the redbanded stink bug (*Piezodorus guildinii*) and brown marmorated stink bug (*Halyomorpha halys*), can also occur in some areas. The redbanded stink bug has greatly changed the use patterns for acephate in Louisiana. Currently, acephate is the only insecticide labeled in soybean that will provide adequate control of this pest, but only when mixed with a pyrethroid. Redbanded stink bug is a voracious feeder that can cause substantial yield and quality losses in soybean from R5 to R8 growth stages if not adequately managed. Feeding from redbanded stink bug results in greater damage and yield loss than any other stink bug species in soybean.

Additionally, it can rapidly re-infest fields after an application and often requires multiple applications at the upper range of the rate scale (0.75-1.0 lb ai/A). This species is an annual pest of soybean in Louisiana and in southern and southeastern Texas. Within a short period of time, this species will also migrate to more northern locations such as Mississippi and Arkansas following mild winters. Although the maximum labeled rate of acephate is 1.5 lbs ai/A in soybean, up to 2.0 lbs ai/A is required to adequately control this pest. This prompted states where this pest occurs to obtain a Section 24c label to increase the maximum seasonal use to 2.0 lbs ai/A.

Summary

The midsouth region of the U.S. has the greatest demand for acephate in cotton and soybean compared to other regions of the U.S. In cotton, most of the acephate use is to target tarnished plant bug in this region. The use of an organophosphate is critical for tarnished plant bug control in the midsouth because of the number of sprays needed each year and the limited number of alternative insecticides with a different mode of action that provide acceptable control. Currently, the maximum seasonal use rate of acephate is used on a small percentage of the acres in the midsouth where tarnished plant bug pressure is greatest and its use occurs over the entire season; however, in Arizona, the maximum use rate is needed when acephate is used, especially late season. Dicrotophos is the only other viable organophosphate for tarnished plant bug management, but severe use restrictions and higher cost limits its utility in IPM. Acephate is also very important for thrips management in most regions of the U.S. as a seed treatment, in-furrow spray, foliar spray, or some combination of these uses.

In soybean, acephate is primarily used to control several stink bug species. Of those, the redbanded stink bug is the most economically important. In areas where redbanded stink bug occurs, a 24c label to increase the maximum seasonal use rate to 2.0 lbs ai/A is critical. In the more southern areas of the U.S., this insect is an annual pest and the seasonal maximum use rate is needed every year. In more northern locations, the pest migrates in from more southern locations and the maximum seasonal use rate is typically needed following mild winters.

Finally, the use of acephate in cotton and soybean IPM programs varies greatly across the U.S., but remains an important component in some regions. Because of that, any restrictions on its use should reflect the needs of the region where actual use patterns are the greatest. Although little concession can be made to the seasonal use rates in those regions, the EPA should consider realistic use patterns in their assessments and realize that other insecticides are being used in a rotational strategy to maximize control and limit selection pressure. We have attempted to highlight some realistic use scenarios in the tables below for different regions of the country. These use scenarios are based on university recommendations as well as consultations with growers and consultants. Most regions of the U.S. can accept some use restrictions, but other regions cannot. Although the current application interval on the acephate label is 7 days, we never recommend more than 2 sequential applications to minimize selection for resistance. As a result, adding some language to the label related to timing of the season, rotation, or application intervals would be acceptable.

Again, we would like to thank the Environmental Protection Agency for the ability to provide input on this important insecticide. We will be more than happy to discuss the use of acephate in our cropping systems and realistic use patterns at any time.

Realistic use scenarios of acephate in cotton for different regions of the U.S.

These are use scenarios for acephate only in a rotation strategy, and other insecticides will be mixed with acephate or used in between acephate applications to manage target pest species. These scenarios are developed under the assumption that other insecticides are available for use. Maximum use scenarios presented are exaggerated examples of possible use but would likely never occur. Realistic use scenarios represent high-use, but likely, situations.

The days represent days after planting

Texas

~12-18 days - 0.25 lb ai/A for thrips

~21-27 days - 0.25 lb ai/A for cotton fleahopper (pre-bloom)

~28-34 days – Imidacloprid or thiamethoxam for cotton fleahopper (pre-bloom)

~35-45 days - 0.25 lb ai/A for cotton fleahopper + Imidacloprid (pre-bloom)

~45-50 days – 0.75 lb ai/A for plant bugs (bloom)

~52-70 days – Sulfoxaflor for plant bugs (bloom)

~70-100 days– 1.0 lb ai/A for stink bug (late bloom)

Total: 2.50 lb ai/A

Southeast (VA, NC, SC, GA, AL, and FL)

At planting: 0.97 lb ai/acre as in-furrow liquid spray OR 6.4 fl oz/cwt seed treatment

~12 days- At 1st leaf: 0.18 to 0.36 lb ai/acre for thrips (pre-bloom)

~19 days- At 3rd leaf: 0.18 to 0.36 lb ai/acre for thrips (pre-bloom)

~76 days- During 3rd week of bloom: 0.75 lb ai/A for stink bugs and plant bugs (bloom)

~90 days- During 5th week of bloom: 0.75 lb ai/A for stink bugs and plant bugs (bloom)

~104 days- During 7th week of bloom: 0.75 lb ai/A for stink bugs and plant bugs (bloom)

In most years, only one application will be required from the third through seventh weeks of bloom.

Total: 2.97 lb/ai/acre (above ground – foliar only)

Midsouth (AR, MS, LA, TN, and MO)

Growth Stage	DAP[a]	Use[b]	Rate/acre (lb AI)	Proportion of Acres	Total Acres	Acres Treated	Total lb AI / use
at-plant, or	0	IST	0.036	0.25	1,980,000	495,000	17,820
at-plant	0	IFS	1.0	0.03	1,980,000	59,400	59,400
1-2 leaf	18	F	0.25	0.5	1,980,000	990,000	247,500
pre-bloom	48	F	0.5	0.33	1,980,000	653,400	326,700
bloom	69	F	0.75	0.8	1,980,000	1,584,000	1,188,000
bloom	79	F	0.75	0.8	1,980,000	1,584,000	1,188,000
bloom	100	F	0.75	0.6	1,980,000	1,188,000	891,000
Seasonal lb AI/acre (with IST and no IFS)			**3.306**		**Total lb AI (based on 1,980,00, acres)**		**3,918,420**
Seasonal lb AI/acre (with no IST and IFS)			**4.0**				
					Average seasonal lb AI per acre (based on 1,980,00, acres)		**1.979**

[a]DAP = days after planting.

[b]Use: IST = insecticide seed treatment, IFS = in-furrow spray, F = foliar.

Realistic use scenarios of acephate in soybeans for North and South Louisiana

These are use scenarios for acephate only in a rotation strategy, and other insecticides will be mixed with acephate or used in between acephate applications to manage target pest species. These scenarios are developed under the assumption that other insecticides are available for use. Realistic use scenarios represent high-use, but likely, situations.

The R stage represents reproductive growth stage at which insecticides are applied:

North Louisiana

~R5-0.75 lb ai/a for stink bugs

~R6.5- 1.0 lb ai/a for stink bugs

Approximately 14-20 days between R5 and R6.5

Total: 1.75 lb ai/a

South Louisiana

~R5.5- 1.0 lb ai/a for stink bugs

~R6.5-1.0 lb ai/a for stink bugs

Approximately 14-20 days between R5 and R6.5

Total: 2.0 lb ai/a