

WHO NEEDS CHLORPYRIFOS AND WHY (BY CROP)?

EXCERPTS OF COMMENTS SUBMITTED TO EPA AT EPA-HQ-OPP-2015-0653

GENERAL

“Consumers I have visited with that do not have any ag background are easily swayed into the belief that farmers are polluting the environment and recklessly applying chemicals. Truth is our farmers are professionals and with today’s pricing cannot afford to be over- or misapplying inputs that affect their bottom lines.... I strongly suggest that you...allow producers of the world’s food source to continue using the product chlorpyrifos.” – *North Dakota farmer.*

“Many food crop industries in the Pacific Northwest are concerned about the impacts to pest management based on EPA’s proposed tolerance revocation of chlorpyrifos, including several minor crop groups with limited pesticide options. These industries include processed vegetables, strawberry, grass seed, mint, and cranberry. For many of these industries, chlorpyrifos has unique properties that make it an essential part of their Integrated Pest Management program. It is also an important tool for resistance management. Several of these industries have conducted research to identify effective alternatives to chlorpyrifos, but currently there aren’t viable alternatives that match the efficacy and low risk of this product for managing a number of critical pests.... A revocation of all chlorpyrifos tolerances would eliminate a number of low-risk, critical uses in cases where few alternatives exist at present, and in many cases those alternatives (neonicotinoids, pyrethroids) would be less efficacious, more expensive and have greater impacts on nontarget species including pollinators and beneficial insects. Further, the economic impacts based on resulting crop damage would be substantial.” – *Oregon State University Agronomist.*

“As an independent consultant who doesn’t sell pesticides and who promotes IPM, I am deeply concerned with EPA revoking tolerances with chlorpyrifos. There are many pesticides available but none like chlorpyrifos.... No other product controls aphid like chlorpyrifos at 1 pint/acre. I’ve tried other products but all failed and caused secondary problems.... Without the availability of chlorpyrifos many of our crops would sustain lower yields, lower quality due secondary pathogens on the leaves...and higher pesticide use from being forced to use less effective products.” – *California licensed crop consultant.*

“California is consistently under threat of new pest insect invasions and although new insecticidal products are available, many or most of these are effective against a narrow spectrum of pests. Considering that California has faced nearly one new invasive pest every year for the past decade, it would be risky to eliminate chlorpyrifos as a control tool. Used judiciously, and in cases where other control methods may not yet be available, chlorpyrifos can continue to play an important role in pest management in California.... The economic sustainability of California agriculture is reliant on the use of chlorpyrifos.” – *USDA Integrated Pest Management Center.*

“I have been making pest control decisions in California for 18 years and have seen the introduction of new products and the phase out of older products. As newer highly selective products have been introduced, the use of older nonselective chemistries such as chlorpyrifos has decreased, and additionally the effectiveness of the older products has increased.... If chlorpyrifos is taken away as a

rotational option more applications of less effective materials will be needed and newer highly selective materials will have to be used earlier and in higher frequency to minimize pest damage.... [O]lder products such as chlorpyrifos are valuable tools for rotation and allow Pest Control Advisors to use true Integrated Pest Management principles. Additionally the loss of chlorpyrifos will lead to overuse of newer chemistries and reduce their effectiveness over time.” – *California licensed pest control advisor*.

“We are very concerned about the revocation of chlorpyrifos, as it is a very useful, cost effective crop protection product used in the production of over 50 crops in 98 countries. Simply revoking the tolerances in the face of lawsuits or threatened lawsuits by organizations whose only goal is to eliminate the use of this type of product is wrong on many fronts. It appears that EPA is using modeling assessments that are very questionable at best, and is not taking into account the fully transparent assessments done in the past that have shown that the product's benefits far outweigh the risks. The loss of chlorpyrifos would be a large financial burden to our industry, as we would have to use more expensive, less effective products leading to yield and crop quality losses.” – *South Dakota Farm Bureau*.

“The loss of chlorpyrifos for our growers in Oregon will have a large, negative impact on their ability to produce seed crops and limit the diversity of their crop rotations. Chlorpyrifos is very important in their Integrated Pest Management programs.... Alternative insecticides to replace chlorpyrifos have major shortcomings. There are a few pyrethroid and neonicotinoid insecticides that could take the place for some uses of chlorpyrifos, but they have not proven to be as effective or consistent because they lack the necessary toxicity to the diverse array of damaging pests, or because their efficacy fails in certain soil or environmental conditions. To make matters worse there is growing evidence that the use of these proposed alternatives may make our epidemic slug problems that already threaten our seed crops even worse, making the loss of chlorpyrifos potentially catastrophic to seed producers.” – *Oregon seed cooperative manager*.

“In the case of chlorpyrifos, a compound that has been widely used for decades, we believe its efficacy and safety when used as directed are amply demonstrated, not just in the literature but in the experience of the agricultural sector. There are more than 50 different crops in more than 98 countries that rely on chlorpyrifos products to help defend against crop failure from a wide array of insect pests. According to USDA, chlorpyrifos has been a part of integrated pest management (IPM) programs for approximately 50 years. Were chlorpyrifos to be eliminated or severely restricted, the impact to farmers would be significant in terms of reduced efficacy of pest management programs, and increased costs to growers as they switch to more expensive alternatives. In some cases, the alternatives are less effective and also more frequently applied, causing a disruption to the current and historical IPM programs and potentially substantial losses due to reduced crop yield.” – *Arkansas Farm Bureau*.

“In Canada, chlorpyrifos is registered for safe use on a wide range of food commodities and remains an important crop protection tool for many Canadian agriculture producers. Our food producers help keep food safe by using and improving on good agricultural and pest management practices. The Government of Canada uses compliance and enforcement activities to make sure producers properly use and apply pesticides and respect established residue limits.... Given our large bilateral trade relationship in agriculture and agri-food products, totaling nearly \$50 billion in 2014, we are concerned that the EPA's revocation on all tolerances for this product may unfairly impact Canadian products exported to the U.S. market.” – *Agriculture and Agri-Food Canada*.

ALFALFA

“Chlorpyrifos is an extremely valuable tool for farmers in managing a wide array of pest insects and is a critical part of Integrated Pest Management (IPM) programs in well over 50 crops grown throughout the United States due to its efficacy, broad-spectrum activity against multiple pests and its fit with conservation biological control in crops, such as citrus, tree fruit and cotton. Revocation of all food tolerances for chlorpyrifos will have a significantly negative impact on the production capabilities and economic stability of producers of many human and animal food crops, particularly where few or no efficacious insecticide alternatives are available, where resistance management with limited alternatives is a concern, where Maximum Residue Limits (MRLs) for effective insecticide alternatives are not established for export markets, and where crops experience invasive and/or endemic pest outbreaks. Tolerance revocations will have immediate and notable impacts on the economic and production stability of many farm crops. A sampling of crops for which chlorpyrifos use is critical includes cotton (\$5.1 billion value of production)...alfalfa (\$10.8 billion)...non-citrus fruit (\$16.3 billion)...citrus (\$3.4 billion)...tree nuts (\$10 billion)...and vegetables (\$13.1 billion)...” – *U.S. Department of Agriculture*.

“Chlorpyrifos, while not used often on most Arizona crops, remains an important "go-to" product in certain situations. Its broad-spectrum efficacy facilitates control of multiple targets, including less common but destructive pests for which there are few if any alternative active ingredients available.... The majority of chlorpyrifos use in Arizona is on alfalfa.... This is an important chemistry in alfalfa because it is effective against multiple pests that can occur simultaneously, some of which have few other labeled options.... Chlorpyrifos, given current label restrictions and Arizona agricultural and pest management practices, can be used without significant risks to human or environmental health in Arizona.” – *University of Arizona Pest Management Center researchers*.

“According to officials at the Arizona Department of Agriculture approximately 30,000 acres in the state were treated with chlorpyrifos this past year. The crops treated were alfalfa (22,000), cotton, (3,500), sorghum (1,100), and pecans (1,800). Although the number of total acres treated may seem small, it highlights the fact that chlorpyrifos is an important crop protection tool. Revoking its tolerance and ultimately its use would result in one less tool available to Arizona farmers. There are times when a particular pest gets out of control and farmers need a product like chlorpyrifos with broad spectrum control, to significantly reduce the pest population. Weather can be a key determinant in determining how severe pest problems will be from year to year. As we experience more extreme weather fluctuations, it is even more important to ensure chlorpyrifos is available to deal with pest problems effectively and efficiently.” – *Arizona Farm Bureau Federation*.

“Chlorpyrifos is very important to our industry and plays a huge role in controlling Lygus bugs. Left unchecked the Lygus bug will completely destroy alfalfa seed production. We are told by government agencies to run an effective Integrated Pest Management program, to rotate chemistries to prevent pests and harmful insects from developing resistance. How are we, as growers, supposed to accomplish this if we are left with one or two compounds that actually work? ...I urge the EPA to help us as growers to continue to produce a reliable and safe seed supply domestically. I urge you not to remove another effective tool needed to produce seed crops that the nation relies on for many of its forage markets.” – *Third-generation Oregon alfalfa seed producer*.

“The loss of chlorpyrifos for use in alfalfa seed production would be a significant economic and cultural hardship for the industry. The pesticide products available are becoming fewer as registrations are

canceled or tolerances revoked. We cannot afford another loss of a tool in our toolbox.” – *Wyoming Alfalfa Seed Grower Association*.

“The preservation of chlorpyrifos as a useful ‘tool’ for insect pest management as a way of reducing insecticide resistance cannot be understated.... All pesticides have potential risks associated with their use, which is why the use of an Integrated Pest Management program is critical, including making choices for pest management based on agronomic, economic, human health and environmental considerations. It is only prudent to make informed decisions when the registration review process has been completed. Especially when you consider that the total number of available products available for insect management in [alfalfa](#) (the second largest crop in California) is limited. Reduction of the total number of products that could be used in a pest management ‘rotation’ creates the possibility of inducing pesticide resistance. This has been shown time-and-time again in different cropping systems with different pests.” – *University of California entomology advisor*.

“The project *Identifying and Managing Critical Uses of Chlorpyrifos in Alfalfa, Almonds, Citrus and Cotton* was initiated in 2014 as a multi-year effort to identify the pest management needs and best management practices for use of chlorpyrifos.... The objective...was to equip California’s pesticide regulatory scientists and other stakeholders in agriculture with a comprehensive understanding of chlorpyrifos use in four unique cropping systems and the alternative practices, products and technologies employed as part of overall IPM approaches.... Chlorpyrifos has been an effective agricultural insecticide used in IPM programs in each of these crops due to its efficacy, value as resistance management tool, established international registration status (MRLs), and as a tool against invasive pests and endemic pest outbreaks.... [K]ey pests for which there are no or few alternatives to chlorpyrifos...and pests for which it is important to retain access to chlorpyrifos as part of the Integrated Pest Management toolbox [include] for [alfalfa](#) - alfalfa weevils, blue alfalfa and cowpea aphids; [almonds](#) - leaf-footed bug and stink bugs; [citrus](#) – ants; and [cotton](#) - late season aphids and whiteflies.... We request the Agency utilize the report to more fully understand the critical uses of chlorpyrifos in California IPM programs and to inform the regulatory process as it moves forward.” – *University of California Statewide Integrated Pest Management Program*.

APPLES

“Woolly Apple Aphid is hard to control and if not controlled can be very damaging to the [apples](#) and apple trees as well. Newer chemistries do not achieve the same level of control and are much more expensive and typically require more than one application. The economic impact can be severe. The advantage of chlorpyrifos is that it works, it is economical, and it is typically used once during the pink stage of an apple bud. If chlorpyrifos is revoked it will have severe impact on several of my acres that are prone to Woolly Apple Aphid infestations, cost more money and time to control and still not effectively be controlled by new chemistries that exist. – *New York State apple grower*.

“In Michigan, corn, soybean and wheat production comprises the majority of our cropping acreage, but specialty crop including [apples](#), dry beans, sugar beets, cherries, seed corn, asparagus, sweet corn, grapes, cabbage, and onions all contribute more than \$10 million individually to our agricultural economy each year. Chlorpyrifos is a key Integrated Pest Management (IPM) tool...in all of these crops. Few other insect control options offer the flexibility, efficacy and trusted safety characteristics.... In soybeans, chlorpyrifos is one of several insecticides utilized for control of...soybean aphids and spider mites.... Chlorpyrifos is the only seed treatment control option for seed corn maggot, a major pest of field corn, seed corn, sweet corn, edible beans and peas. At several crop stages, chlorpyrifos in the only

control option of cabbage maggot in garden greens, radish, cauliflower, and turnips. In stone fruits, particularly the economically important cherry crop, chlorpyrifos is the most effective control of American plum borer. Chlorpyrifos is the predominant control of dogwood borer and San Jose scale in apples. Chlorpyrifos is an important rotating mode of action for numerous other cherry, apple and grape insect pests.... Preventative cultural control options for insect pests are systematically employed in field crop, vegetable and fruit production, but viable chemical control options are essential for IPM systems to be effective. – *Michigan Agribusiness Association*.

ASPARAGUS

“Cutworm populations vary from year to year but I have personally observed cutworms destroying in excess of 25 percent of the season's crop prior to chlorpyrifos becoming registered for use on [asparagus](#).... It is critically important that we retain, at minimum, a single application of chlorpyrifos for cutworm control because it is the only chemistry proven effective in the variable weather encountered in April - May in Michigan.” – *Michigan Asparagus Advisory Board*.

“The Michigan specialty crop vegetable industry represents over 159,000 acres of farmland, producing a plethora of crops including turnips, onions, carrots, radishes, rutabagas, cabbage, brassica crops, cole crops, and [asparagus](#). Without chlorpyrifos, growers estimate a crop loss percentage of 50-95%. This statistic is staggering. Some growers have even voiced their concerns in countless commodity meetings that if the tolerances for chlorpyrifos were revoked, they would have no choice but to forego production of that particular vegetable.... The specialty crop industry has few protection materials, and even if new chemicals were made available in the future, the necessity of chlorpyrifos would undoubtedly be evident, in protecting against insecticide resistance.... Taking tolerances off chlorpyrifos would only send our specialty crop industry into a downward spiral, leaving our members with no effective alternatives to insect control.” – *Michigan Farm Bureau*.

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BRASSICA AND COLE CROPS

“If the corn root maggot gets into the roots of our [brassica and radish crops](#), the crops can be severely damaged or even killed. In the case of damage to [cabbage](#) seed crops, the plants may be stunted so much that they don't go to seed the following spring. I'm aware that research has been done for many years attempting to find an insecticide that works better than Lorsban on corn rootworm maggot, but no replacement has been found. It is imperative that Lorsban be retained....” – *Oregon seed producer.*

“The loss of the use of chlorpyrifos will result in plant yield reduction in fields, weakened plants due to root loss, and in the case of corn, lodging that significantly reduces corn harvest efficiency. It is difficult to estimate the economic impact to the local processed vegetable industry in Oregon as a result of canceling the registration of chlorpyrifos, but it would safe to surmise that the economic impact would be substantial and in the case of [Brassica crops](#), it may eliminate production altogether.” – *Oregon ag cooperative manager.*

“We have grown [Brassica seed crops](#) for over 30 years in Oregon...cabbage, broccoli, cauliflower, kale, and spring cabbage (all for seed)... Without chlorpyrifos it will be very difficult or impossible to grow these crops.... The industry has been looking for good alternatives to chlorpyrifos for maggot control for 30 years at least. We are sure that the loss of chlorpyrifos used in the production of Brassica species will very likely make production of these crops impossible in our area.... In addition...it seems wise to keep the use of an organophosphate insecticide if only to insure against resistance.” – *Oregon seed crop grower.*

“...[T]he availability of broad spectrum products like chlorpyrifos is one of the central reasons why our present vegetable Integrated Pest Management programs have been so successful in the past few years. It is my opinion that the removal of tolerances in vegetable crops would be detrimental to Arizona and California growers. Not only would resistance management programs for Lepidopterous pests and bagrada bugs be in jeopardy with its loss, but in order to prevent economic losses growers would likely resort to using less effective compounds that would need to be applied at much higher frequencies.... I don't foresee any future registrations of new alternative chemistries that would replace chlorpyrifos' role in the management of important pests such as flea beetle, crickets, and most importantly, bagrada bugs in [cole crops](#).” – *University of Arizona entomologist.*

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CHERRIES

“[Cherry](#) growers across the U.S. rely on chlorpyrifos as a critical component of their Integrated Pest Management (IPM) system. It is a broad spectrum tool that has efficacy against key pests. This material does not flare mites and is critical as a rotation partner to help manage resistance.... It is registered for use...to control American plum borer, as well as lesser and greater peach tree borers.... Control of borers is critical in the cherry industry, and chlorpyrifos is the best material we have to control this pest. Some growers would say it is the only effective material that is registered today. Not controlling this insect leads to tree death and will have a huge impact on the economic viability of U.S. cherry farmers.... Chlorpyrifos is also registered for...control for plum curculio as well as green fruit worm and oblique banded leaf roller.... There is a federal law on the books today that mandates if one worm is found at harvest, the entire load is rejected. Many times this means that the grower abandons the orchard, which is a huge economic loss. This zero tolerance for worms means that control is critical during the production stage. Chlorpyrifos is one of the key tools that the cherry industry relies on to achieve the strict regulation of zero worms in fruit.” – *Cherry Marketing Institute*.

“In Michigan the insect complex is diverse and a prebloom spray of a broad spectrum insecticide is critical for season long control. In tart cherries, we use chlorpyrifos as a trunk spray for borer control during the season. Without this control measure, borers would infest tree trunks and tree loss would follow in one to three years. We also use chlorpyrifos as a foliar spray after petal fall for control of borers that infest scaffold limbs, green fruit worm, leaf rollers, and plum curculio. The insect complex in tart [cherries](#) is diverse also and a post bloom broad spectrum insecticide is critical to prevent infestation at harvest time.” – *Michigan orchard grower*.

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CHRISTMAS TREES

“Chlorpyrifos is widely used in [Christmas trees](#) for control of a variety of pests including aphids, needle midge, shoot moth, budworm, scale and adelgids. All of these, except perhaps scale, are significant conifer tree pests in this area. For many producers, chlorpyrifos is a mainstay for insect control since it does have an aerial application label, is quick acting and provides control at least as long as alternative products.... Growers have been reducing their reliance on broad-spectrum organophosphate insecticides such as chlorpyrifos and trying to test newer products. Yet some of the new insecticides do not have a label for use in Christmas trees, some remain quite expensive and biological control of many of the pests in fields remains a difficult goal.” – *Oregon State University tree specialist*.

“As part of our Integrated Pest Management plan, we use chlorpyrifos as an effective Douglas fir needle midge and true fir aphid control when they exceed threshold levels. This insecticide quickly and effectively controls these pests. Our yields improve by not having insect damaged trees. When exporting trees and clearing inspections, this is a key requirement. Also, to provide rotation of controls, taking this insecticide away further complicates this goal. If chlorpyrifos is taken off the market, there is no clear replacement labeled for Douglas fir needle midge. Aphid control would become much more difficult with the current alternatives.” – *Oregon [Christmas tree](#) farmer*.

CITRUS

“Chlorpyrifos is an extremely valuable tool for farmers in managing a wide array of pest insects and is a critical part of Integrated Pest Management (IPM) programs in well over 50 crops grown throughout the United States due to its efficacy, broad-spectrum activity against multiple pests and its fit with conservation biological control in crops, such as citrus, tree fruit and cotton. Revocation of all food tolerances for chlorpyrifos will have a significantly negative impact on the production capabilities and economic stability of producers of many human and animal food crops, particularly where few or no efficacious insecticide alternatives are available, where resistance management with limited alternatives is a concern, where Maximum Residue Limits (MRLs) for effective insecticide alternatives are not established for export markets, and where crops experience invasive and/or endemic pest outbreaks. Tolerance revocations will have immediate and notable impacts on the economic and production stability of many farm crops. A sampling of crops for which chlorpyrifos use is critical includes cotton (\$5.1 billion value of production)...alfalfa (\$10.8 billion)...non-citrus fruit (\$16.3 billion)...[citrus](#) (\$3.4 billion)...tree nuts (\$10 billion)...and vegetables (\$13.1 billion)....” – *U.S. Department of Agriculture*.

“...[S]elect uses of chlorpyrifos are **ABSOLUTELY ESSENTIAL to [citrus Integrated Pest Management \(IPM\)](#)**. Specifically, this material is the ONLY effective and practical treatment for Argentine ant control in southern California and native gray ant [control] in the San Joaquin Valley.... When sprayed on the ground and trunk, this treatment is tremendously effective and non-disruptive to biological control. Without such a treatment, these sugar-feeding ants escalate out of control and then substantial additional chemical treatments are needed for control of soft scales, whiteflies, mealybugs, California red scale, etc. I can’t think of a chemical that is more important to citrus IPM to the extent chlorpyrifos

is. Its use on citrus is absolutely critical so that other chemicals are not needed to control ant-induced species.” – *Professor of Entomology, University of California/Riverside.*

“The project *Identifying and Managing Critical Uses of Chlorpyrifos in Alfalfa, Almonds, Citrus and Cotton* was initiated in 2014 as a multi-year effort to identify the pest management needs and best management practices for use of chlorpyrifos.... The objective...was to equip California’s pesticide regulatory scientists and other stakeholders in agriculture with a comprehensive understanding of chlorpyrifos use in four unique cropping systems and the alternative practices, products and technologies employed as part of overall IPM approaches.... Chlorpyrifos has been an effective agricultural insecticide used in IPM programs in each of these crops due to its efficacy, value as resistance management tool, established international registration status (MRLs), and as a tool against invasive pests and endemic pest outbreaks.... [K]ey pests for which there are no or few alternatives to chlorpyrifos...and pests for which it is important to retain access to chlorpyrifos as part of the Integrated Pest Management toolbox [include] for alfalfa - alfalfa weevils, blue alfalfa and cowpea aphids; almonds - leafhopper bug and stink bugs; citrus – ants; and cotton - late season aphids and whiteflies.... We request the Agency utilize the report to more fully understand the critical uses of chlorpyrifos in California IPM programs and to inform the regulatory process as it moves forward.” – *University of California Statewide Integrated Pest Management Program.*

“The removal of chlorpyrifos uses on citrus would be a significant loss to citrus producers in their efforts to control serious insect pests..... California red scale and citricola scale can cause serious damage to citrus and often require treatment at the same time. Chlorpyrifos is effective in controlling both of these insects.... [R]emoval of the chlorpyrifos use [would] require separate applications of two pesticides instead of one.... The loss of chlorpyrifos would [also] cause severe difficulties in control of sugar feeding ants. Chlorpyrifos is the only highly effective control for ants.... Loss of this use will leave citrus growers without a good alternative.... [C]hlorpyrifos can [also] be very useful in controlling invasive species that can appear without warning. Invasive species can threaten domestic production and important export markets if the invasive species is considered a quarantine pest by important trading partners.... Eliminating the use of chlorpyrifos will be very harmful to biological control programs in California citrus production...[and] growers will be forced to resort to more pesticide applications without chlorpyrifos.” – *California Citrus Quality Council.*

“Chlorpyrifos is unique in the arsenal of citrus insecticides because of its ability to clean up critical problems without destroying the Integrated Pest Management (IPM) program. It has been used safely for nearly 50 years and while not used in the quantities it once was, still remains a very vital material.... World trade and increasing international travel have resulted in more frequent introductions of invasive pests which can seriously threaten Texas’s food production capabilities and economy. A perfect example is the introduction of the Asian citrus psyllid (ACP) [which] carries and transmits a disease called huanglongbing (HLB, also called Citrus Greening) that has no cure and kills citrus trees. Chlorpyrifos...can be used to quickly and effectively control these invasive pests at the same time growers are treating other pests.... Members of Texas Citrus Mutual and growers in the Texas citrus industry need the chlorpyrifos tolerances to remain in place and are committed to proper use and stewardship of products containing chlorpyrifos.” – *Texas Citrus Mutual.*

CORN

“The loss of the use of chlorpyrifos will result in plant yield reduction in fields, weakened plants due to root loss, and in the case of corn, lodging that significantly reduces corn harvest efficiency. It is difficult

to estimate the economic impact to the local processed vegetable industry in Oregon as a result of canceling the registration of chlorpyrifos, but it would safe to surmise that the economic impact would be substantial and in the case of Brassica crops, it may eliminate production altogether.” – *Oregon ag cooperative manager*.

“The total economic impact from sugarbeet production and processing in [North Dakota and Minnesota] was recently estimated at over \$3 billion per year. As such, it is one of the key economic engines in our region. Producers of sugarbeet, as well as those growing sunflower, soybean, corn, canola, small grain crops, forages, and several other commodities, depend on the efficacy that chlorpyrifos-containing insecticides provide against insect pests.... The potential loss of this material for use in sugarbeet pest management would pose a significant threat to profitability for many North Dakota and Minnesota producers.... The most serious economic insect pest of sugarbeet in the Red River Valley is the sugarbeet root maggot.... Published research shows that this pest can cause over 45 percent yield losses in the absence of adequate control, and that postemergence rescue applications of chlorpyrifos can provide major yield increases amounting to revenue benefits of nearly \$130 per acre.... Although I have actively screened several registered and experimental insecticides, I have not identified alternatives that perform at acceptable levels.... [I]t is critical that we maintain the few tools currently available to producers for protecting their crop and sustaining profitability.” – *North Dakota State University professor of entomology*.

“Chlorpyrifos is essential in our area for the control of adult rootworm beetles and for the control of spidermites in corn. Without it, good control of adult rootworm beetles will not be possible. Pyrethroid insecticides offer some control, but when you combine it with chlorpyrifos, you get excellent control. Also by using two different modes of action, you greatly decrease the likelihood of developing resistant populations.... [W]ithout chlorpyrifos our ability to control both adult rootworm beetles and spidermites would be greatly reduced which would result in major yield loss, and would be another tool lost to combat insect resistance with.” – *Kansas independent crop consultant*.

“In Michigan, corn, soybean and wheat production comprises the majority of our cropping acreage, but specialty crop including apples, dry beans, sugar beets, cherries, seed corn, asparagus, sweet corn, grapes, cabbage, and onions all contribute more than \$10 million individually to our agricultural economy each year. Chlorpyrifos is a key Integrated Pest Management (IPM) tool...in all of these crops. Few other insect control options offer the flexibility, efficacy and trusted safety characteristics.... In soybeans, chlorpyrifos is one of several insecticides utilized for control of...soybean aphids and spider mites.... Chlorpyrifos is the only seed treatment control option for seed corn maggot, a major pest of field corn, seed corn, sweet corn, edible beans and peas. At several crop stages, chlorpyrifos is the only control option of cabbage maggot in garden greens, radish, cauliflower, and turnips. In stone fruits, particularly the economically important cherry crop, chlorpyrifos is the most effective control of American plum borer. Chlorpyrifos is the predominant control of dogwood borer and San Jose scale in apples. Chlorpyrifos is an important rotating mode of action for numerous other cherry, apple and grape insect pests.... Preventative cultural control options for insect pests are systematically employed in field crop, vegetable and fruit production, but viable chemical control options are essential for IPM systems to be effective. – Michigan Agribusiness Association.

COTTON

“For decades, chlorpyrifos has been a critical tool for growers to manage pests such as Whitefly which poses a severe threat to the cotton production and ginning industries. The Whitefly, when not properly

managed, creates sugar deposits on cotton lint that...causes excessive wear, increased maintenance and lower quality cotton once in the gin and in the textile mills.... Tank mixes with chlorpyrifos are **required** to control adult whiteflies. The Cotton Aphid...similar to Whitefly, causes sticky cotton from the honeydew the insect secretes..... Chlorpyrifos is the **only active ingredient** that has efficacy and plant canopy penetration to manage late season Cotton Aphid.... Loss of this product would disrupt current programs and may cause outbreaks of secondary pests.” – *California Ginners and Cotton Growers Association*.

“In [cotton](#), chlorpyrifos is critical for management of late-season sucking insects primarily cotton aphids. It is really the only product that will protect the cotton lint during this part of the season. Late-season aphid populations threaten the lint quality through their propensity to deposit excrement (honeydew) on the exposed cotton lint. This greatly hinders the lint ginning and spinning processes and overall causes cotton from areas where late-season insects are not properly managed to be labeled as unacceptable in terms of demand from buyers. My research has shown that as few as 10 aphids per leaf can render the cotton lint as “sticky” and problematic. Other chemistries such as neonicotinoids and flonicamid provide excellent cotton aphid control during the early and mid-season periods but are not effective enough late-season. The large canopy, hardening of the leaf surfaces, preharvest intervals, etc. render these products only marginally acceptable. Other products that used to be applied for control of late-season aphids in cotton such as other organophosphates and endosulfan are no longer registered. While the list of available products for aphid control in cotton may appear extensive, chlorpyrifos is really the only product that will perform adequately in the critical late-season window. The industry has a “zero-tolerance” for sticky cotton and chlorpyrifos is the critical tool for achieving this.” – *University of California at Davis entomologist*.

“The project *Identifying and Managing Critical Uses of Chlorpyrifos in Alfalfa, Almonds, Citrus and Cotton* was initiated in 2014 as a multi-year effort to identify the pest management needs and best management practices for use of chlorpyrifos.... The objective...was to equip California’s pesticide regulatory scientists and other stakeholders in agriculture with a comprehensive understanding of chlorpyrifos use in four unique cropping systems and the alternative practices, products and technologies employed as part of overall IPM approaches.... Chlorpyrifos has been an effective agricultural insecticide used in IPM programs in each of these crops due to its efficacy, value as resistance management tool, established international registration status (MRLs), and as a tool against invasive pests and endemic pest outbreaks.... [K]ey pests for which there are no or few alternatives to chlorpyrifos...and pests for which it is important to retain access to chlorpyrifos as part of the Integrated Pest Management toolbox [include] for [alfalfa](#) - alfalfa weevils, blue alfalfa and cowpea aphids; [almonds](#) - leafhopper and stink bugs; [citrus](#) – ants; and [cotton](#) - late season aphids and whiteflies.... We request the Agency utilize the report to more fully understand the critical uses of chlorpyrifos in California IPM programs and to inform the regulatory process as it moves forward.” – *University of California Statewide Integrated Pest Management Program*.

“According to officials at the Arizona Department of Agriculture approximately 30,000 acres in the state were treated with chlorpyrifos this past year. The crops treated were alfalfa (22,000), [cotton](#), (3,500), sorghum (1,100), and pecans (1,800). Although the number of total acres treated may seem small, it highlights the fact that chlorpyrifos is an important crop protection tool. Revoking its tolerance and ultimately its use would result in one less tool available to Arizona farmers. There are times when a particular pest gets out of control and farmers need a product like chlorpyrifos with broad spectrum control, to significantly reduce the pest population. Weather can be a key

determinant in determining how severe pest problems will be from year to year. As we experience more extreme weather fluctuations, it is even more important to ensure chlorpyrifos is available to deal with pest problems effectively and efficiently.” – *Arizona Farm Bureau Federation*.

CRANBERRIES

“...[W]holesale removal of chlorpyrifos in [cranberry](#) would negatively impact the control of insect pests in all cranberry growing regions. Chlorpyrifos is a broad spectrum, relatively inexpensive insecticide with label restrictions that protect surface water and bees.... The cranberry industry relies on chlorpyrifos because: it is an effective tool for early-season insect management; it fits in an Integrated Pest Management program that minimizes insect resistance; its use poses little impact on the environment and protects water sources; it is not used during bloom so it avoids any contact with pollinators; and it helps handlers that have to navigate the lack of new-product Maximum Residue Levels as they pursue international markets.... Chlorpyrifos plays an important part in controlling insect pests on cranberry. In addition to the impact this [i.e., revocation of chlorpyrifos tolerances] will have on small family farms, eliminating chlorpyrifos from cranberry will significantly reduce insect control options.” – *The Cranberry Institute*.

“Five years ago, we stopped using Lorsban and began using more target specific insecticides.... Three years ago we began seeing spots of black mold on our vines that then covered the [cranberries](#).... The mold has been increasing in spite of our use of other insecticides and fungicides. Last year (2014) there... was so much [mold] in a 2.95 acre fresh fruit grade bog...that we had to throw away all the berries...a loss of \$33,500, a year when we operated at a loss for the fourth year in a row.... We again had a substantial monetary loss for 2015 which was made much worse by the loss caused by the mold. We sent samples of the mold to Washington State University, Oregon State University and Rutgers University. It was finally diagnosed as "sooty mold" which is caused by a microscopic insect, *Coccis Hesperidum*, or brown soft scale. There have now been several other types of scale found in cranberries in our area. The experts believe that scale is now becoming a problem because Lorsban has not been used in recent years on many farms. There very well could be other pests that become severe problems if we cannot use Lorsban. The scale in itself is an extremely serious problem that can be kept under control with Lorsban at a reasonable cost.” – *Oregon cranberry grower*.

FRUIT

“Chlorpyrifos is an extremely valuable tool for farmers in managing a wide array of pest insects and is a critical part of Integrated Pest Management (IPM) programs in well over 50 crops grown throughout the United States due to its efficacy, broad-spectrum activity against multiple pests and its fit with conservation biological control in crops, such as citrus, tree fruit and cotton. Revocation of all food tolerances for chlorpyrifos will have a significantly negative impact on the production capabilities and economic stability of producers of many human and animal food crops, particularly where few or no efficacious insecticide alternatives are available, where resistance management with limited alternatives is a concern, where Maximum Residue Limits (MRLs) for effective insecticide alternatives are not established for export markets, and where crops experience invasive and/or endemic pest outbreaks. Tolerance revocations will have immediate and notable impacts on the economic and production stability of many farm crops. A sampling of crops for which chlorpyrifos use is critical includes cotton (\$5.1 billion value of production)...alfalfa (\$10.8 billion)...[non-citrus fruit](#) (\$16.3 billion)...citrus (\$3.4 billion)...tree nuts (\$10 billion)...and vegetables (\$13.1 billion)....” – *U.S. Department of Agriculture*.

“We have a [fruit](#) farm in Utah, and we depend on this chemical [i.e., chlorpyrifos] to control many insects during the dormant period on all of our fruit. There isn't anything else we can use at this time that works as well. It prevents many other sprays later on in the year that we would have to use. When we use it at dormant time it is all gone when we harvest, no residues are detected when we do our fruit testing at harvest. I urge you to not let this chemical go. We are getting very limited on what we have to use. – *Third generation Utah fruit farmer.*

“Chlorpyrifos is one of the most widely used insecticides in deciduous [fruit](#), nut and vine crops in California and has many advantages over other insecticides. Chlorpyrifos is used on over 400,000 acres of California's deciduous fruit, nut and vine crops (almond, apple , grape, peach , plum, pistachio and walnut) in 2013.... Chlorpyrifos has a wide insect host range but short residue period. This allows for chlorpyrifos to be applied for the control of multiple insect pests with one application but does not have long-term negative impact on beneficial insects.” – *University of California at Berkeley research entomologist.*

GRAPES

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“In Michigan, corn, soybean and wheat production comprises the majority of our cropping acreage, but specialty crop including apples, dry beans, sugar beets, cherries, seed corn, asparagus, sweet corn, [grapes](#), cabbage, and onions all contribute more than \$10 million individually to our agricultural economy each year. Chlorpyrifos is a key Integrated Pest Management (IPM) tool...in all of these crops. Few other insect control options offer the flexibility, efficacy and trusted safety characteristics.... In soybeans, chlorpyrifos is one of several insecticides utilized for control of...soybean aphids and spider mites.... Chlorpyrifos is the only seed treatment control option for seed corn maggot, a major pest of field corn, seed corn, sweet corn, edible beans and peas. At several crop stages, chlorpyrifos is the only control option of cabbage maggot in garden greens, radish, cauliflower, and turnips. In stone fruits, particularly the economically important cherry crop, chlorpyrifos is the most effective control of American plum borer. Chlorpyrifos is the predominant control of dogwood borer and San Jose scale in apples. Chlorpyrifos is an important rotating mode of action for numerous other cherry, apple and grape insect pests.... Preventative cultural control options for insect pests are systematically employed in field crop, vegetable and fruit production, but viable chemical control options are essential for IPM systems to be effective. – *Michigan Agribusiness Association.*

GRASS FOR SEED

“Along with my brother, we grow [perennial ryegrass](#), [creeping bentgrass](#), and [specialty vegetables](#) for seed.... Chlorpyrifos is a critical tool for our operation especially since we grow specialty crops. Sod webworm in creeping bentgrass, root maggot and symphylans in Chinese cabbage seed are a couple of the pests we control with chlorpyrifos. Both of these crops are low acreage, and have no alternative chemistries to control these pests.... Since chlorpyrifos is so effective, we are able to use smaller

amounts when we plant. This is a major benefit of chlorpyrifos, economically and environmentally.” – *Oregon grower.*

“Chlorpyrifos is one of those essential tools that we have continued to keep in our toolbox as an effective way to control pests. It's a tool that we don't always use either. It's only used in specific situations.... [T]his fall when we planted our [perennial ryegrass](#) fields we noticed that once the grass sprouted the seedlings were getting chewed on by cutworms. This field has never had a history of cutworms. In fact we have grown perennial ryegrass on this field through a rotation for three generations and never had an issue. So this year, when we saw the damage and our crop disappearing, we were able to use chlorpyrifos to control the cutworms. This was a spray that only hurt those harmful organisms but left other beneficials in the field to do their good work in our soil. If we didn't have this chemical...our crop would have been eaten up for this year. We would have lost thousands of dollars not only in lost inputs to get the field to the point it was at, but also future earning potential for that piece of ground and crop.... Please know that the use of chlorpyrifos on our farm is an essential tool. One that allows us to grow specialty crops such as vegetable seeds and grass seed. Crops that have a hard time finding a home, and our specific growing region here in Oregon is a perfect spot for them.” – *Oregon farmer.*

“We use Lorsban on our [grass seed](#) crop to control cutworms and symphs., and it is the only product that works in wet conditions. At this time, we have no replacement insecticide for chlorpyrifos, and especially in Oregon because of the wet climate, we need Lorsban to protect our crop.” – *Oregon farmer.*

MINT

“Chlorpyrifos is an important part of the industry’s Integrated Pest Management strategies...to control insect pests impacting our crops. The key pests of economic concern include mint root borers, cutworms, and garden symphylans. Chlorpyrifos is an effective and efficient crop protection product that is widely used on the majority of our acreage.... It is estimated that growers would see approximately two to two-and-a-half times greater expense per acre with new alternative insecticides. That is assuming that the alternatives are as equally effective as chlorpyrifos at controlling the key insect pests.” – *Mint Industry Research Council.*

“Peach tree borers attack and can kill fruit trees. Chlorpyrifos is the most effective protection against borers. Because of the volume of these crops grown in Washington, the inability to control borers could have worldwide consequences. Washington produces a significant portion of the world’s supply of [mint](#) oil. Mint root borer is a serious pest some years. Chlorpyrifos is the only effective tool for this pest. The number of insecticides registered on mint is extremely limited. Loss of this tool could be devastating.” – *Washington Friends of Farms and Forests.*

ONIONS

“The only alternatives to chlorpyrifos in our area are more expensive neonicotinoid-based seed treatments. Removal of chlorpyrifos would make our growers rely exclusively on these neonicotinoid-based treatments. This would greatly increase the likelihood of insecticide resistance developing.... We recognize the importance of applying chlorpyrifos in a safe and effective manner. As a restricted use insecticide, applications of chlorpyrifos are made by licensed applicators who are trained in the appropriate and safe use of this insecticide.” – *Malheur County (Oregon) [Onion Growers Association.](#)*

“Chlorpyrifos is an important insecticide in the [onion](#) production region of southeast Georgia. This insecticide is used to treat soil to prevent soil borne insects from damaging and destroying recently transplanted onions.... Chlorpyrifos is an important tool for this \$100 million plus industry.” – *University of Georgia horticulturalist.*

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PEACHES

“[Peach](#) production is not possible in the southeastern United States without scheduled pesticide applications, which includes the use of chlorpyrifos. Chlorpyrifos is the material of choice for post-harvest tree sprays for the peachtree borer. This late season application is the most efficacious, and there is no alternative pesticide for this application.... Chlorpyrifos is [also] regularly used to manage multiple insect pests of pecan.... I believe it is crucial for Meriwether County growers that tolerances be retained for all fruit and nut crops but most specifically stone fruits and pecans. This pesticide is too critical for the successful production of these crops locally and throughout the whole southeastern United States.” – *University of Georgia agricultural extension agent.*

“With currently available IPM tools [peaches](#) in the southeast are highly susceptible to premature limb loss and premature tree mortality from borers and scale.... Chlorpyrifos is the key insecticide for managing borers; it is also a key material in our multi-component scale management programs. Chlorpyrifos is crucial to southeastern peach growers in part because they have no alternative, it is strongly recommended for use on every acre, every year, across the entire region.... [P]heromone mating disruption trials for the control of lesser peachtree borer and peachtree borer...[have] worked well further north, [but] under southeastern conditions it has yet to provide truly reliable borer control. As much as we would like to be recommending this promising non-toxic approach we haven't been able to make it perform against the very high borer pressure that is endemic in southeastern orchards.” – *University of Georgia entomology professor.*

“An outright ban of chlorpyrifos across all crops and use is shortsighted, unnecessary, and will put a great burden on the peach and nectarine growers and related industries. Lorsban/chlorpyrifos plays an essential role in the [peach/nectarine](#) industry for the protection of trees against the complex of trunk

and limb boring insects, a problem that greatly reduces the lifespan of trees.” – *Michigan State University tree fruit extension specialist.*

PEANUTS

“Georgia is the leading [peanut](#) producing state in the US with over 700,000 acres planted in 2015. Insect pests cause significant yield and quality reductions annually. Chlorpyrifos is the only effective insecticide registered for control of four important peanut pests. The lesser cornstalk borer, the peanut burrower bug, the southern corn rootworm, and wireworms (various species) are soil dwelling insects that feed directly on peanut pods.... [I]n years when pest outbreaks occur or on farms with a history of soil insect infestation, this active ingredient is critically important to preserve peanut quality and maintain grower profitability.... [T]here are currently no effective alternatives approved for use, making chlorpyrifos the only real option for control of several key insect pests.” – *University of Georgia entomologist.*

PEAS

“The use of chlorpyrifos is vital to the growers here in Georgia, and throughout the Southeast. For many of our crops the use of this chemistry is our only viable option management of insect pests. Use of chlorpyrifos is the only Cooperative Extension-recommended product for management of lesser cornstalk borer in commercial peanut production. Also the loss of chlorpyrifos would mean a complete failure to control the cowpea curculio (resistant to all pyrethroids) in Southern [pea](#) production here in the State of Georgia; this would be in all intents and purposes a death knell for pea production in the Southeast.” – *University of Georgia extension agent.*

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PINEAPPLE

“Our company has significantly and intentionally diminished the use of restricted/registered pesticides in our farms, and we intend to continue that trend going forward. Having said that, we believe that having the necessary tools available to control pests remains critical to the viability of Hawaii's [pineapple](#) industry. Control of the ant-mealybug relationship and mealybug wilt is critical to the survival of pineapple in Hawaii.... If the spread of mealybug wilt is unchecked, it may result in additional closure of pineapple operations and loss of agricultural jobs in Hawaii. Because there are very few pesticides

registered for insect control in pineapple, chlorpyrifos, diazinon, malathion collectively, may allow for an adequate number of insecticide applications to control mealybugs and budmoths during the long crop cycle of pineapple.” – *Hawai’i pineapple grower*.

SORGHUM

“Chlorpyrifos, in its various formulations, is a vital tool used in rotation to control damaging pests such as sorghum midge, various aphid species, and sorghum webworm. These products provide a low cost mode of action, necessary for lower value dryland crops like sorghum. In addition, its short residual activity makes it among the more environmentally safe products, especially in the semi-arid conditions in which sorghum is often grown. Sorghum farmers understand the need to balance risk and benefits.... [T]he benefits of chlorpyrifos are clear and the extensive laboratory animal exposure studies strongly point to a reduced risk product that should remain in the toolbox of American farmers.” – *National Sorghum Producers*.

“As a scientist I realize many lay persons do not realize the benefit some organophosphate may deliver to Integrated Pest Management (IPM) programs. Chlorpyrifos is one of those unique organophosphate insecticides that truly can find a positive niche to fill in IPM. Sorghum producers in Louisiana are dependent on chlorpyrifos for sound sorghum pest management and it would be unfortunate to lose this useful tool from our pest management portfolio.” – *Louisiana State University agronomist*.

“Chlorpyrifos is a cornerstone for producing grain sorghum. The crop tolerances must be maintained to provide multiple tools for controlling pests that threaten yield each and every year. Without chlorpyrifos, options are very limited and present a great risk for developing insect resistance to other pesticides available. Without chlorpyrifos we will not have a reliable and economical way to grow corn and grain sorghum; subsequently, we lose two of our already limited choices for crop rotation. Without crop rotation we lose the ability to maintain our soil health/structure and increase the likelihood for wind and water erosion of our farmland. Without crop rotation we will cause another dust bowl that we have intentionally avoided for the last 75 years. Chlorpyrifos crop tolerances have been long established and have proven extremely effective for controlling numerous pests.... [I]n the case of crop tolerances being revoked...with limited options for insect control it will be easy for insects to select for tolerance to pesticides without changing modes of action. The impact on crop value will be devastating as there will be decreased yields and it will cost more to protect and produce these crops.” – *Texas agronomic consultant*.

“In Georgia chlorpyrifos is uniquely effective against certain lepidopteran soil insect pests especially in sorghum and soybeans.... Lesser cornstalk borer tunnels into seedling plants soon after planting thereby destroying the plant’s growing point. Treatments after infestation are not effective and chlorpyrifos applied at planting as a granular formulation is the only effective treatment in sorghum and soybean. Lack of control can cause extensive stand loss resulting in the need to re-plant infested fields. Labeled rates of neonicotinoid seed treatments on sorghum and soybean are not effective against this pest. Chlorpyrifos also is effective in controlling various cutworm species in sorghum soybean and non-Bt corn. Chlorpyrifos is a useful tool for control of soil insects in field corn especially in non-Bt corn where cutworms can be a pest.... [C]hlorpyrifos is an effective pest control chemical and useful component for resistance management within an integrated pest management program.” – *University of Georgia professor of entomology*.

“According to officials at the Arizona Department of Agriculture approximately 30,000 acres in the state were treated with chlorpyrifos this past year. The crops treated were alfalfa (22,000), cotton, (3,500), sorghum (1,100), and pecans (1,800). Although the number of total acres treated may seem small, it highlights the fact that chlorpyrifos is an important crop protection tool. Revoking its tolerance and ultimately its use would result in one less tool available to Arizona farmers. There are times when a particular pest gets out of control and farmers need a product like chlorpyrifos with broad spectrum control, to significantly reduce the pest population. Weather can be a key determinant in determining how severe pest problems will be from year to year. As we experience more extreme weather fluctuations, it is even more important to ensure chlorpyrifos is available to deal with pest problems effectively and efficiently.” – *Arizona Farm Bureau Federation*.

SOYBEANS

“Soybean farmers are well-versed in how to apply chlorpyrifos responsibly and rely on it as a good option in many insect management systems where residual control is either not needed or wanted. Chlorpyrifos is also an important tool for treating double crop soybeans in a rotation such as soybean following wheat, winter canola, or barley. In particular, chlorpyrifos is the leading product used against soybean aphids, the foremost insect pest of soybeans across the northern United States, including the Midwest and Plains states. Without chlorpyrifos, one of the few remaining available compounds in the organophosphorus class of insecticides, farmers will be forced to rely on pyrethroid insecticides, and in just a few years resistance to that class will become a problem. The use of only pyrethroids can lead to outbreaks of pests such as spider mites, and rotational sprays with chlorpyrifos are an essential part of Integrated Pest Management. Soybeans are an important crop both domestically and for exports, and we need to maintain access to broad spectrum and affordable insecticides such as chlorpyrifos.” – *American Soybean Association*.

“Wisconsin grew approximately 1.5 million acres of soybean in 2013 and soybean aphids (*Aphis glycines*) are a key insect pest. Chlorpyrifos is the only active ingredient that controls both soybean aphid and two-spotted spider mites (*Tetranychus urticae*). Although some synthetic pyrethroids may provide adequate control of soybean aphids, they provide poor control of mites but kill predatory mites and other insect predators. This combination of poor two-spotted spider mite control and killing natural enemies of mites leads to flare-ups of two-spotted spider mites.... We look forward to the availability of this tool for the 2016 field season.” – *Two University of Wisconsin entomologists*.

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“Chlorpyrifos is still an important active ingredient to control a variety of crop insects. Its annual use varies based on weather and pest conditions. It's currently used on an estimated average 800,000 acres of diversified Iowa crops, according to industry sources.... It is used primarily to treat [soybean](#) aphid infestations that have become the dominate soybean insect pest in Iowa.... Due to its fast knockdown and control of other pests (such as spider mites and Japanese beetles), chlorpyrifos is the leading product used to control soybean aphids. But due to the high reproductive capacity and migratory movements of aphids, more than one application may be necessary in a single growing season. If this happens, entomologists recommend rotating modes of action to prolong the effectiveness of all products and to prevent developing genetic resistance. Losing the use of chlorpyrifos will increase the likelihood of pest resistance developing among the remaining products.” – *Iowa Farm Bureau Federation*.

“In Michigan, corn, [soybean](#) and wheat production comprises the majority of our cropping acreage, but specialty crop including apples, dry beans, sugar beets, cherries, seed corn, asparagus, sweet corn, grapes, cabbage, and onions all contribute more than \$10 million individually to our agricultural economy each year. Chlorpyrifos is a key Integrated Pest Management (IPM) tool...in all of these crops. Few other insect control options offer the flexibility, efficacy and trusted safety characteristics.... In soybeans, chlorpyrifos is one of several insecticides utilized for control of...soybean aphids and spider mites.... Chlorpyrifos is the only seed treatment control option for seed corn maggot, a major pest of field corn, seed corn, sweet corn, edible beans and peas. At several crop stages, chlorpyrifos is the only control option of cabbage maggot in garden greens, radish, cauliflower, and turnips. In stone fruits, particularly the economically important cherry crop, chlorpyrifos is the most effective control of American plum borer. Chlorpyrifos is the predominant control of dogwood borer and San Jose scale in apples. Chlorpyrifos is an important rotating mode of action for numerous other cherry, apple and grape insect pests.... Preventative cultural control options for insect pests are systematically employed in field crop, vegetable and fruit production, but viable chemical control options are essential for IPM systems to be effective. – *Michigan Agribusiness Association*.

“Orange blossom wheat midge...varies in pressure and presence in our cereal crops of wheat and durum causing shriveled and discolored kernels of our small grains and yield loss.... In 1995 when it first infested North Dakota, my harvested yield was cut in half...and we do not have a lot of choices beyond cereals as our growing...days are limited up north. In trials conducted by North Dakota State University... only chlorpyrifos had activity on the wheat midge and eggs.... Also, chlorpyrifos is one of the few, if not the only product that controls the spider mite in [soybeans](#). Spider mite can affect yield and quality of the soybean crop. Without chlorpyrifos you can detrimentally affect and reduce 50 percent of my farm income from cereals and another 25 percent in soybeans.” – *North Dakota farmer*.

STRAWBERRIES

“Chlorpyrifos has been used safely and effectively for many years in [strawberry](#) production for two very specific pest problems: garden symphylans and strawberry crown moth. There are no other registered alternatives to control these pests; chlorpyrifos is the only registered insecticide for use in strawberries known to control these pests. Both of these pests reside in the soil, which makes their control even more difficult.... Aside from being inexpensive, chlorpyrifos has vapor action, and is non-systemic, soil-active, and quick acting. These attributes contribute to its efficacy and safe use by growers.... We are keenly aware that there are no insecticides on the horizon that will be able to control symphylans and strawberry crown moth larvae as well as does chlorpyrifos.” – *Oregon Strawberry Commission*.

“We are concerned by the uncertainty of the process EPA has employed to propose the revocation of tolerances for chlorpyrifos. It is troubling that EPA has issued this proposal even while the Agency has indicated that there is insufficient science to support cancellation.... Use of chlorpyrifos in strawberries is low. However, in spite of the fact that the pesticide is used sparingly, chlorpyrifos remains a valuable crop protection tool for strawberries, it is especially effective against cutworm in the fall, and it is critical that a tolerance remains in place.” – *California Strawberry Commission*.

SUGARBEET

“Chlorpyrifos is a broad-spectrum control material that has been a part of growers' IPM programs for about 50 years to control a wide array of primary and secondary pests in over 75 cropping systems. The impacts to these cropping systems if chlorpyrifos was eliminated or severely restricted would be immediate and deeply experienced, in terms of efficacy of pest management programs, increased costs to growers switching to more expensive, more frequently applied and less effective alternatives, and disruption to current and historical IPM programs across these cropping systems. In some systems a lack of effective alternatives targeting control of primary pests, such as root maggot in [sugarbeets](#), presents serious concern of economic damage if the pest is left uncontrolled.” – *U.S. Department of Agriculture*.

“My greatest concern is if we lose chlorpyrifos, it will cause us to be more aggressive on treating for [sugarbeet](#) rootworm before we know how much of an outbreak to expect. Liquid chlorpyrifos is our last line of defense because it works well even after the sugarbeet rootworm population is at its peak.... Without chlorpyrifos as a tool, we will need to be more aggressive with at-plant and post-plant granular applications. The net result would likely be an increase of insecticide active ingredients applied and at greater cost.... The sugarbeet farmers of Montana and North Dakota have done a good job at keeping this insecticide contained to the target area, and we should not be punished by hypothetical modeling that creates a problem where one does not actually exist.” – *North Dakota farmer*.

“The main pest of [sugarbeets](#) is the sugar beet root maggot.... Our area is a hot spot for maggot pressure and we need this chemical to treat this pest. My farm would really miss this chemical.” – *North Dakota farmer*.

“The total economic impact from [sugarbeet](#) production and processing in [North Dakota and Minnesota] was recently estimated at over \$3 billion per year. As such, it is one of the key economic engines in our region. Producers of sugarbeet, as well as those growing sunflower, soybean, corn, canola, small grain crops, forages, and several other commodities, depend on the efficacy that chlorpyrifos-containing insecticides provide against insect pests.... The potential loss of this material for use in sugarbeet pest management would pose a significant threat to profitability for many North Dakota and Minnesota producers.... The most serious economic insect pest of sugarbeet in the Red River Valley is the sugarbeet root maggot.... Published research shows that this pest can cause over 45 percent yield losses in the absence of adequate control, and that postemergence rescue applications of chlorpyrifos can provide major yield increases amounting to revenue benefits of nearly \$130 per acre.... Although I have actively screened several registered and experimental insecticides, I have not identified alternatives that perform at acceptable levels.... [I]t is critical that we maintain the few tools currently available to producers for protecting their crop and sustaining profitability.” – *North Dakota State University professor of entomology*.

“In several [sugarbeet](#) growing areas of the region, sugarbeet root maggot pose a serious threat.... Effective control options are limited, and the removal of chlorpyrifos from the tool box would be a major

blow to those producers' ability to produce a crop.... Taking it off the market would impact my ability to conduct research due to the loss of a product that can be used on many crops, a product that is safe to most crops, and a product that is very effective against insect pests....The impact may not be seen immediately, but over time, as the effectiveness of other products diminishes or insect problems occur, the inability to utilize this effective product in a responsible manner will be detrimental.” – *North Dakota contract ag researcher.*

“We deal with a number of insects in Idaho, but leaf miner and black bean aphid are devastating to [sugarbeet](#) crop when they go unchecked. Every year I leave a section of a sugarbeet field untreated with chlorpyrifos and the results are clear: the foliage is 90 percent scarred from insect damage, and the resulting root mass is much smaller and has a higher level of disease. Which means a huge economic impact to the grower, and diseased beets going into storage over the winter and infecting storage piles.... During my tenure on the farm I have yet to see a growing season when I didn't have to make a chlorpyrifos application. Without a substitute pesticide available, I would sustain huge economic losses without this product....” – *Idaho sugarbeet farmer.*

“Another major use for chlorpyrifos in southern Idaho is in [sugarbeets](#). About five to six years ago we were using a product called Temik (aldicarb) to control multiple pests, root maggot, leaf miner and nematodes. Upon losing Temik we changed to chlorpyrifos in order to combat root maggot and leaf miner. While chlorpyrifos is not as good as Temik in controlling these insects, it is way more effective than nothing, which is the option we will be left with without the use of chlorpyrifos.... [O]ne of its great advantages is its ease of use and how well it works. Chlorpyrifos mixes well with several other fertilizers and pesticides. This allows us to apply multiple products with one pass saving time and money for those involved. Chlorpyrifos is also very effective in controlling pests, which allows farmers to accomplish other tasks rather than being concerned about whether or not their chemical application was effective or not.” – *Idaho crop consultant.*

Although the pyrethroid insecticides have controlled pests very well, to date, we are concerned that one or more of the insect pests will begin showing resistance to them. It is extremely important to keep chlorpyrifos so that our growers have an alternative insecticide with a different mode of action. Pyrethroid insecticides only control the pest for about five-to-seven days, so in many cases have to be applied more than once a season. Chlorpyrifos has a different mode of action and will control the pest for a longer period of about eight-to-ten days.... [U]se of chlorpyrifos is a necessity for our production area until we have several alternatives with different modes of action to include in our pest control arsenal.” – *Colorado [sugar](#) cooperative senior research agronomist.*

“We use chlorpyrifos on our farm as a way to help control [sugarbeet](#) root maggots. There are not many products available to help control this very destructive insect. We need every tool available and mode of action or delivery to be effective in controlling sugarbeet root maggot. Removal of Chlorpyrifos from the market will hurt our industry greatly in increasing our costs of production and hurting our overall yield.” – *Minnesota sugarbeet grower.*

SUNFLOWER

“Year to year, [sunflower](#) growers don't know which pests are going to pop up.... Chlorpyrifos is one of the few materials left to sunflower growers that they rely on for effective control. We know chlorpyrifos is restricted and we treat it with respect. Growers have safely used chlorpyrifos for years, and need it in

their toolbox. If we didn't have chlorpyrifos, we'd be using more frequent sprays of less-effective material, and more fuel and other farm inputs, none of which would be good for the environment.” – *National Sunflower Association*.

“The total economic impact from sugarbeet production and processing in [North Dakota and Minnesota] was recently estimated at over \$3 billion per year. As such, it is one of the key economic engines in our region. Producers of sugarbeet, as well as those growing [sunflower](#), soybean, corn, canola, small grain crops, forages, and several other commodities, depend on the efficacy that chlorpyrifos-containing insecticides provide against insect pests.... The potential loss of this material for use in sugarbeet pest management would pose a significant threat to profitability for many North Dakota and Minnesota producers.... The most serious economic insect pest of sugarbeet in the Red River Valley is the sugarbeet root maggot.... Published research shows that this pest can cause over 45 percent yield losses in the absence of adequate control, and that postemergence rescue applications of chlorpyrifos can provide major yield increases amounting to revenue benefits of nearly \$130 per acre.... Although I have actively screened several registered and experimental insecticides, I have not identified alternatives that perform at acceptable levels.... [I]t is critical that we maintain the few tools currently available to producers for protecting their crop and sustaining profitability.” – *North Dakota State University professor of entomology*.

TREE FRUIT

“I have served as a Michigan State University [tree fruit](#) extension specialist and advisor to 360+ farms of the Michigan peach, nectarine, and apricot industries for 22 years. An outright ban of chlorpyrifos across all crops and use is shortsighted, unnecessary, and will put a great burden on the peach and nectarine growers and related industries. Lorsban / chlorpyrifos plays an essential role in the peach / nectarine industry for the protection of trees against the complex of trunk and limb boring insects, a problem that greatly reduces the lifespan of trees.... The alternative, pheromone disruption, is...useful for large, mature orchards with few missing trees, [but] will not work on young and older orchards, on smaller orchards, or those orchards of irregular shape. Trunk application of chlorpyrifos is the only effective strategy to prevent damage by borers in these situations. Other chemicals we have tested are ineffective for this pest complex.” – *Michigan State University fruit extension specialist*.

“We believe that the loss of the chlorpyrifos registration on U.S. [treefruit](#) crops will provide serious production challenges to our fruit grower clientele- and will ultimately raise production costs and make our growers less competitive in the global market. In the northeast U.S., chlorpyrifos is a key tool in pest management programs for San Jose scale, woolly apple aphid and borers on apples and for control of scale and borer insect pests in stone fruit crops. While there are some other somewhat effective options vs. these key insect pests, dormant application of chlorpyrifos provides a reliable and cost-effective resistance management tool.... We believe that maintaining the registration for chlorpyrifos as a dormant application will reduce overall insecticide use on treefruit crops in the northeast U.S. - and conversely that revoking the chlorpyrifos registration will lead to increased total usage of insecticides on our treefruit crops.” – *New York State orchard crop consultant*.

TREE NUTS

“Chlorpyrifos is an extremely valuable tool for farmers in managing a wide array of pest insects and is a critical part of Integrated Pest Management (IPM) programs in well over 50 crops grown throughout the United States due to its efficacy, broad-spectrum activity against multiple pests and its fit with

conservation biological control in crops, such as citrus, tree fruit and cotton. Revocation of all food tolerances for chlorpyrifos will have a significantly negative impact on the production capabilities and economic stability of producers of many human and animal food crops, particularly where few or no efficacious insecticide alternatives are available, where resistance management with limited alternatives is a concern, where Maximum Residue Limits (MRLs) for effective insecticide alternatives are not established for export markets, and where crops experience invasive and/or endemic pest outbreaks. Tolerance revocations will have immediate and notable impacts on the economic and production stability of many farm crops. A sampling of crops for which chlorpyrifos use is critical includes cotton (\$5.1 billion value of production)...alfalfa (\$10.8 billion)...non-citrus fruit (\$16.3 billion)...citrus (\$3.4 billion)...[tree nuts](#) (\$10 billion)...and vegetables (\$13.1 billion)....” – *U.S. Department of Agriculture*.

“New Mexico is one of the largest [pecan](#) producing states in the nation with a substantial amount of the crop exported to other countries that include China and Mexico. Over 2,000 pecan farms contribute approximately \$140 million to the state’s economy through their pecan sales. Within the pecan growing industry, black margined aphid is considered a primary pest. Black margined aphid herbivory results in early defoliation, reduced nut quality, and reduced flower set the subsequent year. Chlorpyrifos continues to be highly efficacious on black pecan aphid in New Mexico pecans and is used, in part, as a component of an insecticide resistance management program.... If chlorpyrifos is removed from the agriculture market...collectively the yield losses will result in an important reduction in the state’s economy.” – *New Mexico State University entomologist*.

“Chlorpyrifos is one of the most widely used insecticides in deciduous fruit, [nut](#) and vine crops in California and has many advantages over other insecticides. Chlorpyrifos is used on over 400,000 acres of California's deciduous fruit, nut and vine crops (almond, apple , grape, peach , plum, [pistachio](#) and [walnut](#)) in 2013.... Chlorpyrifos has a wide insect host range but short residue period. This allows for chlorpyrifos to be applied for the control of multiple insect pests with one application but does not have long-term negative impact on beneficial insects.” – *University of California at Berkeley research entomologist emeritus*.

“The project *Identifying and Managing Critical Uses of Chlorpyrifos in Alfalfa, Almonds, Citrus and Cotton* was initiated in 2014 as a multi-year effort to identify the pest management needs and best management practices for use of chlorpyrifos.... The objective...was to equip California’s pesticide regulatory scientists and other stakeholders in agriculture with a comprehensive understanding of chlorpyrifos use in four unique cropping systems and the alternative practices, products and technologies employed as part of overall IPM approaches.... Chlorpyrifos has been an effective agricultural insecticide used in IPM programs in each of these crops due to its efficacy, value as resistance management tool, established international registration status (MRLs), and as a tool against invasive pests and endemic pest outbreaks.... [K]ey pests for which there are no or few alternatives to chlorpyrifos...and pests for which it is important to retain access to chlorpyrifos as part of the Integrated Pest Management toolbox [include] for [alfalfa](#) - alfalfa weevils, blue alfalfa and cowpea aphids; [almonds](#) - leaftooted bug and stink bugs; [citrus](#) – ants; and [cotton](#) - late season aphids and whiteflies.... We request the Agency utilize the report to more fully understand the critical uses of chlorpyrifos in California IPM programs and to inform the regulatory process as it moves forward.” – *University of California Statewide Integrated Pest Management Program*.

“Although there are many insecticides which target a specific pest or small range of pests, there are few available insecticide options that act against as broad of a range as that which chlorpyrifos covers. Lorsban is a therefore the most cost-effective option for growers, and is an important tool used within a

rotation of insecticides to manage insect resistance.... [Hazelnut](#) shipments exported to markets abroad can also face rejection at the border if infestation of pests, such as the filbertworm, are found.... Should hazelnut growers lose the ability to use chlorpyrifos, and be forced to adopt newer insecticides that may not be registered and do not have tolerances established yet in a foreign market, U.S. hazelnut producers may face trade restrictions in that market. The cost and time that must be expended to seek the establishment of a new tolerance in an export market, combined with the cost of sales lost during that time, could reach millions of dollars.” – *Oregon Hazelnut Commission*.

“According to officials at the Arizona Department of Agriculture approximately 30,000 acres in the state were treated with chlorpyrifos this past year. The crops treated were alfalfa (22,000), cotton, (3,500), sorghum (1,100), and [pecans](#) (1,800). Although the number of total acres treated may seem small, it highlights the fact that chlorpyrifos is an important crop protection tool. Revoking its tolerance and ultimately its use would result in one less tool available to Arizona farmers. There are times when a particular pest gets out of control and farmers need a product like chlorpyrifos with broad spectrum control, to significantly reduce the pest population. Weather can be a key determinant in determining how severe pest problems will be from year to year. As we experience more extreme weather fluctuations, it is even more important to ensure chlorpyrifos is available to deal with pest problems effectively and efficiently.” – *Arizona Farm Bureau Federation*.

VEGETABLES

“Chlorpyrifos is an extremely valuable tool for farmers in managing a wide array of pest insects and is a critical part of Integrated Pest Management (IPM) programs in well over 50 crops grown throughout the United States due to its efficacy, broad-spectrum activity against multiple pests and its fit with conservation biological control in crops, such as citrus, tree fruit and cotton. Revocation of all food tolerances for chlorpyrifos will have a significantly negative impact on the production capabilities and economic stability of producers of many human and animal food crops, particularly where few or no efficacious insecticide alternatives are available, where resistance management with limited alternatives is a concern, where Maximum Residue Limits (MRLs) for effective insecticide alternatives are not established for export markets, and where crops experience invasive and/or endemic pest outbreaks. Tolerance revocations will have immediate and notable impacts on the economic and production stability of many farm crops. A sampling of crops for which chlorpyrifos use is critical includes cotton (\$5.1 billion value of production)...alfalfa (\$10.8 billion)...non-citrus fruit (\$16.3 billion)...citrus (\$3.4 billion)...tree nuts (\$10 billion)...and [vegetables](#) (\$13.1 billion)....” – *U.S. Department of Agriculture*.

“Chlorpyrifos has been the main stay for soil insect control for over 40 years. Its effectiveness, soil residual (30 days), and relatively low cost makes it the product of choice. Our members would like to have more tools to control insects, but even if new chemistry appeared today, we would still need chlorpyrifos to be used in rotation with other insecticides to slow the development of insecticide resistance. Chlorpyrifos has a number of other advantages for vegetable production. Because the product is very effective on many insect pests, and is fast acting, it can be relied on to knock [back] high populations of insects as they quickly invade vegetable fields from neighboring crops. Newer chemistries tend to work slower and oftentimes need to be applied prior to pest infestations to be effective. If EPA revokes crop tolerances for this product it will greatly reduce our members' ability to produce high quality produce and remain profitable. Our industry has already lost a significant amount of market to foreign producers due to lack of competitiveness. The loss of chlorpyrifos in the United States may accelerate this process.” – *Northwest [Vegetable Growers Association](#)*.

“Along with my brother, we grow perennial ryegrass, creeping bentgrass, and [specialty vegetables](#) for seed.... Chlorpyrifos is a critical tool for our operation especially since we grow specialty crops. Sod webworm in creeping bentgrass, root maggot and symphylans in Chinese cabbage seed are a couple of the pests we control with chlorpyrifos. Both of these crops are low acreage, and have no alternative chemistries to control these pests.... Since chlorpyrifos is so effective, we are able to use smaller amounts when we plant. This is a major benefit of chlorpyrifos, economically and environmentally.” – *Oregon grower*.

“Alternative insecticides for the control of seed corn maggot, cabbage maggot, and corn root worm larvae have major shortcomings. There are a few pyrethroid and neonicotinoid insecticides that could take the place for some uses of chlorpyrifos, but they have not proven to be as efficacious or consistent because they lack the spectrum of toxicity to a diverse array of damaging pests, or because their efficacy fails in certain soil or environmental conditions.” – *Oregon Processed Vegetable Commission*.

“...[T]he availability of broad spectrum products like chlorpyrifos is one of the central reasons why our present vegetable Integrated Pest Management programs have been so successful in the past few years. It is my opinion that the removal of tolerances in [vegetable](#) crops would be detrimental to Arizona and California growers. Not only would resistance management programs for Lepidopterous pests and bagrada bugs be in jeopardy with its loss, but in order to prevent economic losses growers would likely resort to using less effective compounds that would need to be applied at much higher frequencies.... I don't foresee any future registrations of new alternative chemistries that would replace chlorpyrifos' role in the management of important pests such as flea beetle, crickets, and most importantly, bagrada bugs in cole crops.” – *University of Arizona entomologist*.

“The Michigan specialty crop [vegetable](#) industry represents over 159,000 acres of farmland, producing a plethora of crops including turnips, onions, carrots, radishes, rutabagas, cabbage, brassica crops, cole crops, and asparagus. Without chlorpyrifos, growers estimate a crop loss percentage of 50-95%. This statistic is staggering. Some growers have even voiced their concerns in countless commodity meetings that if the tolerances for chlorpyrifos were revoked, they would have no choice but to forego production of that particular vegetable.... The specialty crop industry has few protection materials, and even if new chemicals were made available in the future, the necessity of chlorpyrifos would undoubtedly be evident, in protecting against insecticide resistance.... Taking tolerances off chlorpyrifos would only send our specialty crop industry into a downward spiral, leaving our members with no effective alternatives to insect control.” – *Michigan Farm Bureau*.

WHEAT

“Lorsban and other chlorpyrifos-containing products are a key active for use with Orange blossom [wheat](#) midge, Russian wheat aphid, and many other insect pests that are of sudden outbreak. This is one of the few remaining chemistry options that is systemic in the plant aiding in pest control under cool, dry or other environmental stress conditions that inhibit control. If chlorpyrifos is no longer an option, that will lead to crop decimation with other products lack[ing] efficacy on certain pests.” – *Montana ag retailer*.

“Chlorpyrifos has...been important to growers of North Dakota, because it is the only insecticide that can effectively kill some of the insect pests. In [wheat](#), for example, chlorpyrifos is the most efficacious and cost effective insecticide for control of wheat midge. During the midge outbreak of the mid-1990s, crop

losses were estimated on over 725,000 acres of wheat that were valued at over \$27 million to North Dakota. Other registered insecticides have not been as effective in controlling wheat midge and reducing yield losses.... Chlorpyrifos is [also] the insecticide of choice for control of aphids and spider mites in many field crops. Spider mites are able to reproduce rapidly and have multiple generations per year, which makes them high risk for developing insecticide resistance with repeated applications of the same insecticide. For example, most pyrethroid insecticides cause spider mite populations to 'flare up' (rapid population density increases) and do not reduce mite populations. In contrast, chlorpyrifos provides excellent efficacy of severe spider mite populations and prevent economic yield losses.... It is important that agricultural growers and agribusinesses are able to compete in the global markets and have effective pest management tools like chlorpyrifos." – *North Dakota State University extension entomologist.*

"In Michigan, corn, soybean and [wheat](#) production comprises the majority of our cropping acreage, but specialty crop including apples, dry beans, sugar beets, cherries, seed corn, asparagus, sweet corn, grapes, cabbage, and onions all contribute more than \$10 million individually to our agricultural economy each year. Chlorpyrifos is a key Integrated Pest Management (IPM) tool...in all of these crops. Few other insect control options offer the flexibility, efficacy and trusted safety characteristics.... In soybeans, chlorpyrifos is one of several insecticides utilized for control of...soybean aphids and spider mites.... Chlorpyrifos is the only seed treatment control option for seed corn maggot, a major pest of field corn, seed corn, sweet corn, edible beans and peas. At several crop stages, chlorpyrifos is the only control option of cabbage maggot in garden greens, radish, cauliflower, and turnips. In stone fruits, particularly the economically important cherry crop, chlorpyrifos is the most effective control of American plum borer. Chlorpyrifos is the predominant control of dogwood borer and San Jose scale in apples. Chlorpyrifos is an important rotating mode of action for numerous other cherry, apple and grape insect pests.... Preventative cultural control options for insect pests are systematically employed in field crop, vegetable and fruit production, but viable chemical control options are essential for IPM systems to be effective. – Michigan Agribusiness Association.

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