IN THE UNITED STATES COURT OF APPEALS
FOR THE EIGHTH CIRCUIT

RED RIVER VALLEY SUGARBEET GROWERS ASSOCIATION, ET AL. Petitioners, v. MICHAEL S. REGAN, Administrator, U.S. Environmental Protection Agency, ET AL., Respondents.	No. 22-1422

Declaration of Neil Anderson

I, Neil Anderson, state as follows:

1. I declare that the following statements are true and correct to the best of my knowledge and belief and are based upon my personal knowledge and/or my review of information contained in the records of the United States Environmental Protection Agency ("EPA" or the "Agency") or supplied by current employees.

2. I am currently the Deputy Director of the Biological and Economic Analysis Division ("BEAD") in the EPA's Office of Pesticide Programs ("OPP"). I have held this position since April 2019. I have worked in the OPP for over 30 years and have served in various positions. Prior to holding the position of Deputy Director, I served as the acting Deputy Director of the Antimicrobials Division in

OPP from September 2018 to March 2019 and as a Branch Chief in the Pesticide Re-evaluation Division ("PRD") in OPP from 2010 to 2018.

3. I am making this Declaration in support of EPA's opposition to Petitioners' Renewed Motion for a Partial Stay Pending Review filed in the above captioned case.

4. FIFRA requires EPA approval of pesticides prior to their distribution or sale and establishes a registration regime for regulating the use of pesticides. 7 U.S.C. § 136a(a). EPA must approve an application for pesticide registration if, among other things, the pesticide will not cause unreasonable adverse effects on the environment. *Id.* FIFRA defines "unreasonable adverse effects on the environment," in part, as "(1) any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide." 7 U.S.C. § 136(bb).

5. BEAD provides pesticide use-related information and economic analyses in support of pesticide regulatory activities. Information about how much and the manner in which pesticides are actually used helps EPA evaluate potential exposures, the need for various pesticides, and the potential economic impacts of regulatory options.

6. The pesticide chlorpyrifos (0,0-diethyl-0-3,5,6-trichloro-2-pyridyl phosphorothioate) is a broad-spectrum, chlorinated organophosphate (OP)

insecticide that has been registered for use in the United States since 1965. The OPs are a group of closely related pesticides that affect functioning of the nervous system. Pesticide products containing chlorpyrifos are registered for use on many agricultural crops, including, but not limited to, corn, soybeans, alfalfa, oranges, wheat, and walnuts. Additionally, chlorpyrifos products are registered for use on nonfood sites such as ornamental plants in nurseries, golf course turf, and as wood treatment. There are also public health uses including aerial and ground-based mosquito adulticide fogger treatments, use as fire ant control in nursery stock grown in USDA-designated quarantine areas, and for some tick species that may transmit diseases such as Lyme disease. The majority of uses in residential settings were voluntarily canceled over two decades ago. *See*, *e.g.,* Chlorpyrifos; Cancellation Order, 65 Fed. Reg. 76,233 (Dec. 6, 2000); Chlorpyrifos; End-Use Products Cancellation Order, 66 Fed. Reg. 47,481 (Sept. 12, 2001).

7. Pursuant to the Federal Insecticide, Fungicide, and Rodenticide Act ("FIFRA"), EPA is required to re-evaluate existing registered pesticides at least every 15 years in a process called "registration review." 7 U.S.C. 136(a)(g). The purpose of registration review is "to ensure that each pesticide registration continues to satisfy the FIFRA standard for registration," (40 C.F.R. § 155.40(a)(1)), taking into account changes that have occurred since the last registration decision, including any new relevant scientific information and any

changes to risk-assessment procedures, methods, and data requirements. 40 C.F.R. § 155.53(a). To ensure that a pesticide continues to meet the standard for registration, EPA must determine, based on the available data, including any additional information that has become available since the pesticide was originally registered or re-evaluated, that the pesticide does not cause "unreasonable adverse effects on the environment." 7 U.S.C. § 136a(c)(1), (5); *see also* 40 C.F.R. § 152.50.

8. On March 18, 2009, EPA opened a public docket to initiate registration review of chlorpyrifos. *See*, *e.g.*, Chlorpyrifos Summary Document Registration Review: Initial Docket, March 2009 (Mar. 18, 2009), *available at* https://www.regulations.gov/document/EPA-HQ-OPP-2008-0850-0002.

9. In December 2020, EPA released the Proposed Interim Decision for the Registration Review of Chlorpyrifos ("2020 PID") for a 60-day public comment period. Pesticide Registration Review: Proposed Interim Decision for Chlorpyrifos (Dec. 7, 2020), *available at* https://www.regulations.gov/document/EPA-HQ-OPP-2008-0850-0964. The 2020 PID concluded that "[w]hen considering all currently registered agricultural and non-agricultural uses of chlorpyrifos, aggregate exposures are of concern." *Id.* at 19. However, the 2020 PID also noted that if one considered only the uses that result in estimated drinking water concentrations ("EDWCs") below the drinking

water level of comparison ("DWLOC"), then aggregate exposures would not be of concern. *Id.* Accordingly, the 2020 PID proposed to limit applications of chlorpyrifos in this country to only 11 uses, at lowered application rates, and only in certain regions of the United States due to benefits considerations, and concluded that those uses resulted in EDWCs that were below the DWLOC. This proposed path forward was intended to offer to stakeholders a way to mitigate the aggregate risk from chlorpyrifos.

10. The 11 uses and the geographic restrictions assessed in the 2020 PID were identified by BEAD as presenting high benefits to growers or by Corteva as a critical registered use. BEAD completed an assessment of the usage, role and pest management benefits of chlorpyrifos in agricultural settings ("2020 Benefits Assessment"). Revised Benefits of Agricultural Uses of Chlorpyrifos (PC# 059101) (Nov. 18, 2020), *available at* https://www.regulations.gov/document/EPA-HQ-OPP-2008-0850-0969. This document was released for public comment following the release of the 2020 PID in December. The Agency received 144 public comments on the 2020 PID and supporting assessments and intends to respond to those comments during registration review.

11. In addition, pursuant to the Regulatory Flexibility Act (RFA), 5 U.S.C. § 601 et seq., BEAD conducted a small business analysis to assess the

economic impact of the Final Rule on small entities ("2021 SBA Analysis"). Chlorpyrifos Revocation Small Business and Employment Analysis (August 12, 2021) (attached to this declaration). That analysis was prepared consistent with other analyses that are prepared for rules subject to notice and comment pursuant to the RFA. The RFA requires an agency to consider the economic impacts that rules subject to notice and comment rulemaking will have on small entities. Since the final rule revoking tolerances was not subject to notice and comment, the analysis was not required, but it was prepared to present information on the potential impact to small farms and possible job losses for industry as a result of the revocation of chlorpyrifos tolerances.

12. On February 28, 2022, several growers, grower groups, and Gharda Chemicals International, Inc. (collectively, "Petitioners") filed in the Eighth Circuit Court of Appeals a Renewed Motion for a Partial Stay Pending Review (the "Renewed Motion for Partial Stay"). *RRVSG Assoc., et al., v. Regan, et al*., No. 22-1422 (8th Cir. 2022). Petitioners state that they will suffer irreparable economic harm absent a stay of the Final Rule and specifically identify alleged impacts relating to sugarbeets (*id.* at 22), peaches (*id.* at 23), cherries (*id.*), and soybeans (*id.* at 24).

13. As noted in EPA's 2020 Revised Benefits of Agricultural Uses of Chlorpyrifos memorandum, chlorpyrifos is widely used on agricultural crops in the

United States, with an average of 8.8 million acres being treated annually between 2014-2018. 2020 Benefits Memo at 2. On average, however, those 8.8 million acres amount to only around 3% of the total acres harvested of those crops each year. 2020 Benefits Memo at 9-10.

14. For the 11 uses that were assessed in the 2020 PID (alfalfa, apple, asparagus, tart cherry, citrus, cotton, peach, soybean, strawberry, sugar beet, and spring and winter wheat), the Agency estimates that 6.7 million acres were treated with chlorpyrifos, based on data from 2010-2014 and 2014-2018. Compared to the total acres harvested for those commodities in the United States, that means that approximately 4.4% of the total acres harvested was treated with chlorpyrifos. 2020 Benefits Memo at 9-10.

15. EPA's estimate of impacts on growers (combination of yield losses and/or increases in pest control cost) across the subset of these 11 uses can be calculated from Table 2.1-1 of EPA's 2020 Benefits Memo. Adding up the range of impacts from that table for the 11 identified uses yields a range of impacts between $9.2 and $96.6 million per year, with likely losses around $53 million.

16. The fact that 4.4% of the harvested acreage for the 11 crops are treated with chlorpyrifos also means that the impact on total farm revenues due to the loss of chlorpyrifos is likely to be relatively small. Overall, EPA estimates the total annual revenue for the 11 high-benefit crops to be $82 billion, based on

EPA's estimates of gross revenue in its 2021 SBA Analysis. Comparing the impacts of substituting alternatives for chlorpyrifos and/or absorbing yield losses to the total annual revenue for those high benefit crops indicates that anticipated losses would account for under 0.1% of growers' expected revenue.

17. Moreover, based on the 2021 SBA Analysis, EPA concluded that there was not likely to be a significant impact on a substantial number of small entities and that there are unlikely to be significant job losses as a result of the revocation of the rule. Of the approximately 2 million farms currently in the United States, only an estimated 43,430 farms are using chlorpyrifos each year. For about 25,100 affected farms, the impacts of tolerance revocation are less than 1% of gross revenue. Up to 10,500 small farms could see impacts of between 1 and 3% of gross revenue per acre for affected crops. This is less than 1% of all small crop farms. An estimated 1,900 farms would see per-acre impacts of greater than 3%, about 0.13% of small farms producing crops. 2021 SBA Analysis at 2.

18. EPA's analysis of possible small business impacts compares per-acre losses to average gross revenue per acre to determine the impact of losing chlorpyrifos. EPA has found that gross revenue per acre varies considerably across crops with field crops such as sorghum and sunflower generating average revenues of around $300 per acre while many fruit and vegetable crops generate revenues of $5,000 to $10,000 per acre, on average. The per-acre comparison to gross revenue

is likely an over-estimate of the impacts as a proportion of gross revenue for a farm. The per-acre impacts would only equal farm impacts under certain very stringent conditions: (1) The grower would have to produce only the crop in question; (2) All acres in production would have to be treated with chlorpyrifos, and (3) Chlorpyrifos would have to be applied every year. 2021 SBA Analysis at 6-7.

19. As a general matter, overall farm-level impacts will be lower than the per-acre impacts because farms tend to produce a diverse selection of crops, including crops that do not rely on chlorpyrifos. Even small farms typically diversify production across multiple crops for a number of reasons, and many farms also raise livestock. Crop and livestock production are often complementary, with crops providing feed for livestock and livestock often providing manure to improve soil fertility. Differences in field characteristics, such as soil type, draining, and slope, can influence which crops are grown. Rotation of multiple crops across seasons or years (on the same field) is a common agricultural practice utilized for many agronomic purposes, including pest management. Moreover, because different crops have different planting and maturation dates, diversification allows the grower to spread the demand for resources across time and avoid shortages, especially of labor, at peak times. Diversification reduces the risk of yield and/or price variability within a single commodity. *Id*. at 7.

20. The Petitioners claim that the loss of chlorpyrifos will result in an economic loss of $82 million on sugarbeets. *Id.* at 23, citing Att. 2, Ex. G (Hastings Decl.) at ¶¶20-21; Att. 2, Ex. F (Geselius Decl.) at ¶22; Att. 2, Ex. I (Metzger Decl.) at ¶18). This number greatly exceeds EPA's estimate of likely impacts of loss of chlorpyrifos of $2.6 to $32.2 million, with likely costs being closer to $6.8 million when taking into consideration the limited extent of severe sugarbeet root maggot problems (*i.e.*, EPA estimates that only 20% of chlorpyrifos-treated sugarbeet acres in Minnesota and only 10% of chlorpyrifos-treated sugarbeet acres in North Dakota are subject to severe sugarbeet root maggot pressure) that would result in yield losses without chlorpyrifos. *See* 2020 Benefits Memo at 49. The declarants (Geselius and Metzger) state in their declarations that they multiply the Agency's $500 loss per acre value with the average number of sugarbeet acres treated with chlorpyrifos (regardless of target pest) by their cooperative members to calculate losses of $30 million and $17.5 million per year, respectively. Ex. F at ¶22; Ex. I at ¶18. EPA's $500 loss per acre estimate is only relevant to the yield losses expected from acres in counties that are subject to severe sugarbeet root maggot pressure; that amount of loss is not expected on every acre to which chlorpyrifos is applied. *See* 2020 Benefits Memo at 49. Some of those acres would not be expected to have severe infestations of

root maggot or even any root maggot pressures at all; for some acres, chlorpyrifos may be applied to target other pests.

21. Moreover, EPA estimates that, on average, only 61,200 acres total (targeting all pests) are treated with chlorpyrifos in these states but recognizes that the extent of acres infested with pests can vary from year to year. 2020 Benefits Memo at 8. EPA acknowledges that chlorpyrifos use seems to have increased substantially in 2020, based on Kynetec survey data obtained in 2022, although there is insufficient information to know if that is a long-term increase. Based on EPA's analysis, the expected impact in Minnesota and North Dakota is likely to be a cost closer to $5.1 million when considering the limited extent of severe sugarbeet root maggot that would be uncontrolled without chlorpyrifos. 2020 Benefits Memo at 49. Due to the different pest pressures in other sugarbeet states, EPA calculates a cost of around $1.8 million per year in those other states. Together, that is a cost of $6.8 million per year, or about 2.8% of the total revenue for sugarbeet-acres treated with chlorpyrifos. 2020 Benefits Memo at 48-49.

22. Paragraph 27 of the Hastings declaration states that "EPA admits that 20% of Minnesota sugarbeet acreage and 10% of North Dakota acreage could be lost." ¶ 27. This is a misinterpretation of EPA's analysis included in the 2020 Benefits Assessment. *Id*.

23. As stated in paragraph 20 of this declaration and in the 2020 Benefits Assessment, EPA found that less than 20% of chlorpyrifos-treated acres in Minnesota were severely impacted by sugarbeet root maggot pest pressures and around 10% of chlorpyrifos-treated acres in North Dakota were severely impacted by sugarbeet root maggot. Those numbers did not refer to a proportion of all acres on which sugarbeets were grown, only the percentage of acres treated with chlorpyrifos that are likely to be severely impacted by a particular pest. EPA focused on those specific acres because for those acres, EPA identified potential yield losses as a result of limited efficacy of available alternatives for those severe pest pressures. But even with the limited pest control, EPA's modeled yield losses of 45%; EPA did not conclude that 100% of those impacted acres would be "lost". The remaining chlorpyrifos-treated acres in Minnesota (about 80%) and North Dakota (about 90%), which are themselves only a subset of the total number of sugarbeet acreage in those states, were not expected to be under the same pest pressures. Thus, it is not correct to conclude, based on EPA's analysis, that there will be a complete loss of 20% of sugarbeet acreage in Minnesota (or 10% in North Dakota).

24. Paragraph 27 of the Hastings Declaration says that 20% acreage losses in Minnesota and 10% acreage losses in North Dakota "would threaten the very existence of [American Crystal Sugar Company]." While EPA estimated 45%

yield losses in fields where the sugarbeet root maggot could not be controlled without chlorpyrifos, EPA is unable to estimate effects on individual entities, whether farms (see para. 19) or processors. While the American Crystal Sugar Company may face difficulties when fewer sugarbeets are available, it is unclear how that would affect the company as a whole. According to ACSC's website, ACSC has five processing facilities in different areas of the Red River Valley, as well as a wholly owned facility in Sidney, MT. *See* https://www.crystalsugar.com/our-company/locations/. Yield losses of up to 45% are a possible outcome in areas with severe infestation, and a processing facility in that area could see a substantial decline in raw product, which could mean that that particular facility operates at a loss this growing season. However, the pest is not evenly distributed across the entire sugarbeet acreage that is processed by ACSC. Some of the cooperative's processing facilities may be within the area of high potential damage, while others may be in areas with less pest pressure.

25. Moreover, as stated in the Hastings declaration (paragraph 9), 37% of ACSC's acres are impacted by sugarbeet root maggot pest pressures, including 61,769 acres that are severely impacted by the sugarbeet root maggot; those severely impacted acres account for approximately 15% of their 410,000 total member acres. Att. 2, Ex. G (Hastings Decl.) at ¶¶16, 20. As discussed above, yield losses of up to 45% are possible on those severely impacted acres.

26. Furthermore, there is a natural variation in production from year to year and in yields per acre year to year depending on various factors, e.g., weather, pest pressures, decisions about planting. Over the five years from the 2016/2017 season to the 2020/2021 season, total sugarbeet production in Minnesota and North Dakota has ranged from about 13 million tons to about 19 million tons, with a mean of about 17 million tons, with the lowest production in year 2019/2020. *See* U.S. Department of Agriculture Sugar and Sweeteners Yearbook Tables, Table 14 (last updated Feb. 16, 2022), available at https://www.ers.usda.gov/data-products/sugar-and-sweeteners-yearbook-tables.aspx. The smallest production year had production about 23% lower than average in both states. Although EPA notes that 2019/2020 was an especially bad year, it shows that ACSC can continue as an entity in years with lower production. EPA acknowledges that, in localized areas, the sugarbeet root maggot could cause yield loss on the order of 45%, but EPA does not expect that statewide production would be affected so severely. As per the 2020 Benefits Assessment, data showed about 28% of total sugarbeet acreage in MN and ND were treated with chlorpyrifos and BEAD estimated that 20% of the treated area was subject to severe sugarbeet root maggot pressure.

27. For most crops treated with chlorpyrifos, EPA has determined that there are alternatives for controlling the pests targeted by chlorpyrifos. 2020 Benefits Memo at 5. For example, EPA has concluded that there are several

alternatives for controlling the primary soybean pests (soybean aphid, bean leaf beetle, and spider mite). Thiamethoxam and imidacloprid are among the effective alternatives for controlling major soybean pests. The costs of these alternatives are slightly higher than the cost of chlorpyrifos but still only impact about 0.2-0.8% of gross revenue. Essentially, the estimated range of impacts on total soybean revenue ($3.1-12.2 million) is a function of the acres treated – 3.1 million, on average, out of 71 million acres harvested recently. 2020 Benefits Memo at 46. EPA has also registered flupyradifurone for use on soybeans, which is also an effective pesticide against soybean pests, although since it was registered in 2017, it was not included in the 2020 Benefits Memo. (https://www3.epa.gov/pesticides/chem_search/ppls/000264-01198-20190905.pdf).

28. For most crops on which chlorpyrifos is registered, EPA has concluded that there are adequate alternatives to provide control of the pests typically targeted by chlorpyrifos. 2020 Benefits Memo at 5. While some alternatives may not be as efficacious or may be more expensive, they are available for most crops. Memo at 5. Moreover, pesticides represent only one method of pest control for farmers. Growers may use other methods of pest control to reduce susceptibility to pests, e.g., removing damaged tree limbs and pruning carefully to

decrease opportunities for wood-boring insects, integrated pest management, biological control with natural insect enemies, etc.

29. In addition, as pesticide markets open through the loss of a control option or new pests emerge, existing chemicals are registered on additional crops or new products are developed. Although EPA concludes that most growers who use chlorpyrifos will replace it with other insecticides, some growers may find non-chemical management tactics such as biological control with insect natural enemies to be cost effective over time as understanding of their optimal deployment improves. As a result of the introduction of new effective insecticides and improvements in deploying non-chemical pest management strategies, estimated impacts to growers may decrease over time. 2020 Benefits Memo at 13.

30. EPA recognizes that there may be some crops in certain locations for which the alternatives are not adequate. Yield losses may occur, but the severity and the timing of those losses can be uncertain. For example, orchard crops may still be able to produce fruit, until the infestations become so bad that trees are lost, but those effects can take a number of years to be fully realized. For example, a peach tree or cherry tree can still continue to produce fruit, even if infested with trunk borers, although the life of the tree may be shortened as a result of the infestation. 2020 Benefits Memo at 22-23. By EPA's estimation (as described in the 2020 Benefits Memo at 22-23), in heavily infested orchards, only about 20% of

trees are affected by borers and about half of those trees continue to bear fruit. In contrast, EPA has been unable to find reliable quantitative estimates for yield losses and shortened tree lifetime for tart cherries. *Id.*

31. EPA recognizes that emerging pests and the potential for resistance present some uncertainties in evaluating potential economic costs for growers. However, unless there is evidence of a particular pest imminently becoming a large problem or resistance becoming widespread, these factors are simply uncertainties. For example, although the Cherry Marketing Institute expressed concern that chlorpyrifos is the only effective chemistry for the treatment of trunk borers and that loss of the pesticide would open the industry to substantial loss of trees (Ex. T, ¶ 10), EPA's data indicates that the trunk borer is a minor pest, in terms of chlorpyrifos use on tart cherry trees. While there is a possibility of increased pest pressure in the future, at this time it is premature to conclude that loss of chlorpyrifos will have a major impact on cherry farmers since the trunk borer is not a widespread pest for cherry trees at this time. It is unclear whether growers will have economic injury from these factors because the very nature of these factors is speculative. EPA does not typically include costs associated with these factors due to their very speculative nature. *See* 2020 Benefits Memo at 13.

In accordance with 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed this 10th day of March 2022.

Neil Anderson

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON D.C., 20460

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

MEMORANDUM

SUBJECT: Chlorpyrifos Revocation Small Business and Employment Analysis

FROM: Brett Gelso, Ph.D., Team Lead Economist
Derek Berwald, Ph.D., Senior Economist
Economic Analysis Branch

THRU: T J Wyatt, Acting Chief
Economic Analysis Branch

TO: Alexandra Feitel, Chemical Review Manager
Dana Friedman, Branch Chief
Risk Management and Implementation Branch I
Pesticide Reevaluation Division (7508P)

Summary

EPA regulates pesticides that are used on crops grown for food by setting tolerances, which are limits on the amount of pesticide residues that remain in or on food or animal feed that is sold in the U.S. Under the Federal Food, Drug, and Cosmetics Act (FFDCA), if a pesticide does not have a food tolerance, pesticide residues left on food or animal feeds will render the commodity "adulterated" and it cannot be sold. EPA is pursuing a rulemaking that will revoke all food tolerances for chlorpyrifos, which means that growers will no longer be able to apply chlorpyrifos to food crops. This memo presents information on the potential impact to small farms of the tolerance revocation as well as possible job losses for the industry. Based on the analysis in this memo, EPA finds that there is not a significant impact on a substantial number of small entities and that there are unlikely to be significant job losses as a result of this rule.

EPA performed an earlier small business analysis (EPA, 2015a); this memo updates that analysis with recent information on the impacts of cancelling chlorpyrifos tolerances on the farm industry. A small business analysis, based on guidelines in the RFA, allows EPA to determine whether a rule has the potential to cause a significant economic impact on a substantial number of small entities (SISNOSE), in this case, small farms. In both the 2015 analysis and this one, EPA determined that there is not a SISNOSE from revocation of chlorpyrifos tolerances on all food crops.

There are approximately 2 million farms currently in the U.S.; out of those farms there are about 1.5 million small farms that produce crops (Census of the Ag, 2017), of which an estimated 43,430 are farms using chlorpyrifos each year. For about 25,100 affected farms, the impacts of tolerance revocation are less than 1% of gross revenue. Up to 10,500 small farms could see impacts of between 1 and 3% of gross revenue per acre for affected crops. This is less than 1% of all small crop farms. An estimated 1,900 farms would see per-acre impacts of greater than 3%, about 0.13% of small farms producing crops. Estimated impacts per-acre of a specific crop will likely overestimate the impacts as a proportion of total farm income. Based on the criteria set forth in this analysis, EPA certifies that the revocation of the tolerances for chlorpyrifos will not have a significant impact on a substantial number of small entities. However, EPA acknowledges that some small farms, especially those without alternatives to chlorpyrifos, could face large per-acre impacts.

Background

The Regulatory Flexibility Act (RFA), 5 U.S.C. 601 et seq., calls for agencies to consider the economic impacts rules will have on small entities. The purpose of the RFA is to ensure that, in developing rules, agencies identify and consider ways of tailoring regulations to the size of the regulated entities because small entities may face disproportionately large impacts, particularly from recordkeeping and reporting requirements. The RFA does not require an agency to minimize a rule's impact on small entities if there are legal, policy, factual or other reasons for not doing so. The Regulatory Flexibility Act (5 U.S.C. 601 et seq), generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedures Act or any other statute. This rule, which is issued under FFDCA section 408(d)(4)(A)(i) (21 U.S.C. § 346a(d)(4)(A)(i)), directly in response to a petition under FFDCA section 408(d), is not subject to notice and comment and does not require a regulatory flexibility analysis. However, EPA is conducting the analysis in this memo to understand the impacts of chlorpyrifos on the small business community and inform EPA decisionmakers.

The RFA does not analytically define the terms “significant” or “substantial” with regard to extent of economic impact and number of small entities affected, and there is general agreement that there can be no one-size-fits-all methodology for making the SISNOSE determination. Therefore, the EPA established general guidelines (EPA 2006) for determining whether an action may be certified as having no significant economic impact on a substantial number of small

entities (no SISNOSE). In general, the determination depends on the magnitude of the potential economic impacts on the directly regulated small entities.

Following general EPA guidelines (EPA 2006), OPP considers losses of more than 3% of gross revenue at the farm level to be a significant impact on the small entities identified; losses of less than one percent of gross revenue are not considered significant and losses between one and three percent of gross revenue at the farm level are possibly significant.

If the estimated impact is greater than 1% of per-farm gross revenue, OPP determines whether a substantial number of small entities may be affected, where a substantial number depends on both the absolute number and share of small entities directly affected.

OPP continues the use of thresholds at which the number of small entities impacted would not be considered "substantial" used in past analyses (Wyatt, 2008; EPA 2015b; EPA, 2016). If the estimated impact is between 1% and 3% of average per-farm gross revenue, OPP set the following thresholds at which the number of small entities that may be impacted would not be considered "substantial:"

- Less than 100 small farms may be so impacted, provided the number represents less than 30% of all affected small farms;
- Between 100 and 1,000 small farms may be so impacted, provided the number represents less than 20% of all affected small farms; or
- More than 1000 small farms may be so impacted, but the number represents less than 10% of all affected small farms.

If the estimated impacts exceed 3%, or if impacts cannot be quantified, the thresholds at which OPP concludes a substantial number of small farms would not be affected are as follows:

- Less than 100 small farms may be so impacted, provided the number represents less than 20% of all affected small farms;
- Between 100 and 1,000 may be so impacted, but account for less than 10% of all affected small farms; or
- More than 1000 small farms may be so impacted, but the number represents less than 5% of all affected small farms.

The revocation of tolerances for chlorpyrifos could potentially affect any small farm producing crops, since chlorpyrifos is currently registered for use on most crops.

Methodology

Identifying Small Entities

Under the RFA, "small entity" includes small businesses, small governments, and small organizations. The RFA references the definition of "small business" found in the Small Business Act, which authorizes the Small Business Administration (SBA) to define "small

business" by regulation. SBA has established such definitions for each of the business categories listed in the North American Industrial Classification System (NAICS) in 13 CFR 121.201. A small business is defined by either the number of employees employed by the business or by the annual dollar amount of sales/revenues of the business.

For the purposes of assessing the potential adverse economic impacts on small entities directly regulated by this action, EPA has focused its analysis on producers of crops (*i.e.*, small farms) who may currently use chlorpyrifos for control of insect pests and may have adverse economic impacted as a result of the action revoking the tolerances for chlorpyrifos. EPA did not assess the impacts to livestock producers, although tolerances will be revoked for meat, eggs, and milk. The only direct use of chlorpyrifos in livestock production affected by the revocation is for a cattle ear tag to repel insects for which there are multiple alternative insecticides available. Otherwise, tolerances account for residues that may be present in livestock products via feed, such as corn, that may be produced with chlorpyrifos; as minimal impacts are expected in these commodities as a result of the tolerance revocation, livestock producers will not incur any indirect impacts such as increases in feed prices. OPP has also determined that small governments and small organizations will not be affected by the revocation of the tolerances addressed in this action since these entities would not be using chlorpyrifos to produce food commodities.

As noted earlier, the level at which an entity is considered small is determined for each sector by the SBA, identified by NAICS code. Farms that produce crops are classified under NAICS code 111, Crop Production, or NAICS code 112, Animal Production. For these sectors, the SBA defines small entities as farms with total annual sales of $1,000,000 or less[1]. Over 95 percent[2] of U.S. farms are considered small under the SBA definition, according to data from the 2017 Census of Agriculture (USDA NASS 2019), the most recent data available.

Table 1 presents several statistics from the U.S. Department of Agriculture on large and small farms. The Small Business Administration defines a small farm to be one with annual revenue of less than $1,000,000. According to data from the 2017 Census of Agriculture (USDA NASS, 2019), the average farm with revenues less than $1,000,000 per year has about 120 acres in crop production and annual revenue of about $65,187, including revenue from the production of all agricultural products, including livestock.

[1] Two subsectors within NAICS 112 are defined differently, feedlots (112112) are defined to be small if revenues are less than $7.5 million per year and chicken egg production facilities (112310) are defined to be small if revenues are less than $15 million per year. These entities are unlikely to have significant crop production relative to their primary activity.

[2] In order to calculate the number of small farms producing crops under the $1 million dollar threshold, farms with revenues of less than $1 million was divided by total farms \

Table 1. Farms that Produce Crops, Average Crop Acreages and Average Crop Revenue, 2017

	All Farms	Large Farms	Small Farms	Small Farms Using Insecticides
Number of Farms[1]	1,475,627	68,322	1,407,305	264,175
Average Crop Acreage	207 acres	2009 acres	120 acres	206 acres
Average Revenue	$194,625	$3,504,201	$65,187	$65,187
Average Revenue per Acre	$937	$1,745	$542	$542

Source: 2017 Census of Agriculture

[1] Number of farms include farms that produce crops for NAICS 111 (Crop Production) and NAICS 112 (Animal Production). Total farms producing crops for NAICS 111 and 112 are given on Table 75 in the 2017 Census of the Agriculture. Farm revenue for farms that produce crops were derived from Table 72. Small farms producing crops was the difference between total farms producing crops and large farms producing crops.

Pesticide use is somewhat more common among large farms than small farms. Data from the 2017 Census indicate that about 86% of farms using insecticides such as chlorpyrifos are small under the SBA definition[3]. The percentage of small farms using insecticides was estimated by dividing small farms using insecticides by all farms using insecticide. Small crop-producing farms that use pesticides tend to be larger, on average, than all small crop-producing farms and have higher revenues.

Estimating Impacts Resulting from Tolerance Revocation

EPA regulates pesticides that are used on crops grown for food by setting tolerances, which are limits on the amount of pesticide residues that remain in or on food or animal feed that is sold in the U.S. Under FFDCA, if a pesticide does not have a food tolerance, pesticide residues left on food or animal feed will render the commodity "adulterated" and it cannot be sold. Thus, as a consequence of revoking the food tolerances, growers who would normally rely on chlorpyrifos will need to use an alternative means of pest control. If the alternative is less effective, or if alternatives are not available, growers may suffer yield or quality losses that could result in reductions in revenue. More expensive alternatives could result in higher production costs. In the case of chlorpyrifos, effective alternatives are available for most crops, although often at higher cost. In some cases, alternatives may be less effective (*e.g.*, asparagus, peanuts, grapefruit,

[3] The percentage of small farms using insecticides was estimated as the number of small farms using insecticides divided by all farms using insecticides

lemons, oranges) or unavailable (*e.g.*, cutworms in Michigan asparagus and borers in Southeast peaches).

The purpose of this analysis is to estimate the farm-level impacts of revoking tolerances as a proportion of gross revenue. In November 2020, EPA published *Revised Benefits of Agricultural Uses of Chlorpyrifos (PC# 059101)* (EPA 2020) which estimated the per-acre benefits of chlorpyrifos in a variety of crops, including those most reliant on chlorpyrifos use. These estimates of benefits are sufficient to provide estimates of the costs of revoking chlorpyrifos tolerances, as the per-acre benefits to growers are equivalent to the costs or impacts imposed on them by making chlorpyrifos unavailable for use. These per-acre impacts are part of an overall farm enterprise that typically produces multiple crops. Because the impacts do not affect all of the acreage on a farm, the farm-level impact, as a percentage of gross revenue, will be lower than that of the per-acre impacts of specific crops.

To assess the value of chlorpyrifos on a crop, in the benefits memo EPA identified the primary pests targeted by chlorpyrifos through a review of the label and private pesticide market research data consisting of the results of marketing surveys of growers. University extension recommendations along with the market research data were used to identify the likely alternatives to chlorpyrifos and the costs of the alternatives to chlorpyrifos. Differences in insecticide costs were estimated on a per-acre basis. In situations where crops have no alternatives or less efficacious alternatives to chlorpyrifos, yield and/or quality losses were also considered. Only currently registered alternatives were considered. However, for the crops for which alternatives are limited or not available, new control methods may be registered or be developed over time. Past experience has shown that as new pests occur or markets for existing pests open up, new chemicals are developed or existing chemicals use patterns are expanded to fill the gaps in pest control, although EPA did not consider that possibility when developing the benefit estimates that are the basis for the analysis here.

Farm-Level Impacts Resulting from Tolerance Revocation

For this analysis, per-acre losses are compared to average gross revenue per acre to determine the impact of losing chlorpyrifos. Average gross revenues are calculated from USDA statistics on acreage, production, and value of crops (see Appendix). As shown in the Appendix, gross revenue per acre varies considerably across crops with field crops such as sorghum and sunflower generating average revenues of around $300 per acre while many fruit and vegetable crops generate revenues of $5,000 to $10,000 per acre, on average. The average revenue for a small farm is $542 per acre (Table 1), indicating a mix of crops that is likely skewed toward field crops. This per-acre comparison to gross revenue is likely an over-estimate of the impacts as a proportion of gross revenue for a farm. The per-acre impacts would only equal farm impacts under certain very stringent conditions:

- The grower would have to produce only the crop in question,
- All acres in production would have to be treated with chlorpyrifos, and

- Chlorpyrifos would have to be applied every year.

Overall farm-level impacts will be lower than the per-acre impacts because farms tend to produce a diverse selection of crops, including crops that do not rely on chlorpyrifos. Even small farms typically diversify production across multiple crops for a number of reasons, and many farms also raise livestock. Crop and livestock production are often complementary, with crops providing feed for livestock and livestock often providing manure to improve soil fertility. Differences in field characteristics, such as soil type, draining, and slope, can influence which crops are grown. Rotation of multiple crops across seasons or years (on the same field) is a common agricultural practice utilized for many agronomic purposes, including pest management. Moreover, because different crops have different planting and maturation dates, diversification allows the grower to spread the demand for resources across time and avoid shortages, especially of labor, at peak times. Diversification reduces the risk of yield and/or price variability within a single commodity. In addition, several states, such as California, Oregon and New York, have taken action to eliminate chlorpyrifos use, and those changes have not been considered in the estimates here. Growers in those states will lose access to chlorpyrifos even without EPA action, and those cost impacts should rightly be considered a result of state action, not the revocation of tolerances being considered here.

Further, as indicated by the low percent crop treated with chlorpyrifos for many crops, the pests targeted by chlorpyrifos may be sporadic in nature. Thus, it would be rare that all acres in production on a farm would require treatment with chlorpyrifos, much less every year.

Number of Farms Impacted

Private agricultural market data (Kynetec USA, 2020) are used to estimate the number of farms applying pesticides by active ingredient. Data are collected through a stratified survey using a statistically valid sample by state, not including Alaska and Hawaii. For this analysis, EPA summed the number of entities estimated to use chlorpyrifos for each crop. This could overestimate the number of entities using chlorpyrifos because the same entity might use chlorpyrifos on multiple crops.

The market survey data do not distinguish farms by size according to the SBA definition. According to data from the 2017 Census of Agriculture (USDA NASS 2019), about 86% of the farms using insecticides are considered small. EPA uses these percentages to estimate the number of small farms using chlorpyrifos that may be impacted at levels exceeding one percent of average per-farm gross revenue.

Estimated Impacts and Conclusion

Table 2 summarizes the results of the crop-specific assessments. The table presents the range of cost per acre for each crop, based on the 2020 chlorpyrifos benefits memo (EPA 2020). Also

shown is the impact per acre of the high-end impact estimate, shown as a percentage of gross revenue per acre. The use of high-end impact estimates may tend to overestimate the impact. Gross revenue per acre is presented in the Appendix to the 2020 chlorpyrifos benefits memo and also reproduced as an appendix to the memo. For most of the crops listed, EPA concluded that there are adequate alternatives to provide control of pests typically targeted by chlorpyrifos. However, use of alternatives may entail additional control costs to the grower. In some cases, alternatives may not be as efficacious as chlorpyrifos and yield or quality losses may occur. Table 2 also presents the estimated number of farms using chlorpyrifos for each crop, based on proprietary market survey data (Kynetec, 2010 – 2014 and 2014 - 2018).

Table 2. Summary of Impacts of Revoking Chlorpyrifos Tolerances.

Crop	Impact / Acre [1]	Percent of Per-Acre Gross Revenue (High Impact)	Farms Impacted [2] (Large and Small)
Crops with impacts greater than 3% of Gross Revenue per Acre			
MI Asparagus[4]	$0 - $450	25%	80
Lemons [3]	$10 - $290	4%	210
Oranges (CA) [3]	$8 - $201	5%	900
Other Citrus, (CA)	$8 - $201	5%	270
GA and SC Peaches[3,4]	$12 - $430	10%	100
Fresh Peas	$10 - $370	48%	10
Sorghum	$3 - $4	3%	370
OR Strawberries[3,4]	$6 - $7,813	100%	40
MN and ND Sugarbeets[3,4]	$13 - $498	45%	160
Subtotal			**2,140**

Crop	Impact / Acre [1]	Percent of Per-Acre Gross Revenue (High Impact)	Farms Impacted [2] (Large and Small)
Crops with Impacts between 1% and 3% of Gross Revenue per Acre			
Beans, Succulent	$29	2%	40
Broccoli	$8 - $68	1%	10
Cabbage	$14 - $78	1%	10
Cauliflower	$11 - $90	1%	10
Cherries (sweet)	$3 - $65	4%	810
Cherries (tart)	$17 - $170	2%	130
Corn	$6 - $8	1%	6480
Cotton, foliar treatment	$0 - $14	2%	200
Cotton, seed treatment	$0 - $9	1%	1750
Grapefruit [3]	$9 - $44	1%	100
Grapes (Table)	$7 - $130	1%	80
Grapes (Wine)	$4 - $91	2%	80
Onions	$11 - $66	1%	240
Oranges, Florida	$2 - $33	1%	370
Other Citrus (FL)	$8 - $201	1%	90
Peanuts [3]	$10 - $10	1%	350
Pecans	$1 - $11	1%	1140
Sugar Beets, other than MN and ND	$0 - 12	1%	1570
Subtotal			**12,170**
Crops with Impacts less than 1% of Gross Revenue per Acre			
Alfalfa	$0 - $1	0%	9530
Almonds[3]	$7 - $35	1%	580
Apples	$12 - $51	1%	2470
Apricots	$7 - $33	1%	10
Asparagus	$6 - $20	1%	110
Canola	$2 - $3	1%	20
Celery	$0 - $0	0%	10
Cranberry	$14 - $35	<1%	300
Cucumbers	$0 - $0	0%	10
Dry Beans/Peas	$0 - $19	0%	40
Garlic	$0 - $0	0%	10
Hazelnuts	$0 - $3	<1%	40
Mint	$19	1%	290
Peaches	$8 - $27	0%	400
Pears	$5 - $37	0%	190
Peppers	$5 - $10	0%	10
Pistachios	$0 - $0	0%	10
Plums/Prunes	$7 - $33	1%	70
Sorghum (Milo)	$2	1%	270

Crop	Impact / Acre [1]	Percent of Per-Acre Gross Revenue (High Impact)	Farms Impacted [2] (Large and Small)
Soybeans	$1 - $4	1%	9610
Strawberries	$0 - $0	0%	210
Sunflowers	$0 - $1	0%	560
Sweet Corn [5]	$1 - $3	0%	300
Tobacco	$4 - $4	0%	800
Tomatoes	$7 - $7	0%	10
Walnuts	$2 - $36	0%	1160
Wheat, Spring	$0 - $1	0%	1300
Wheat, Winter	$0 - $1	0%	1090
Subtotal			**29,120**
Crops with Little Chlorpyrifos Use [6]			
Cantaloupe[7]	not estimated	-	not estimated
Potato	not estimated	-	not estimated
Pumpkins[7]	not estimated	-	not estimated
Squash[7]	not estimated	-	not estimated
Watermelons[7]	not estimated	-	not estimated
Subtotal			**-**
TOTAL			**43,430**

1 Source: EPA estimates.

2 Source: Kynetec USA (2020) for sugarbeets, sorghum and brassica crops. When there are less than 10 affected farms, the number is rounded up to 10.

3 In addition to chemical cost increases, these crops may also have some losses due to a reduction in yield or quality.

4 These crops have important regional conditions that require analysis at a regional level.

5 The number of sweet corn farms account for foliar chlorpyrifos applications only and does not account for farms that use chlorpyrifos-treated sweet corn seed, for which usage data are not available.

6 The impacts were not calculated for these crops because the percent of the crop treated (PCT) is low which indicates that there are cost-effective alternatives available and/or that the target pests are sporadic in nature or not particularly damaging.

7 The impacts were not calculated because usage data for chlorpyrifos as a seed treatment is unavailable for these crops.

The total number of farms estimated to use chlorpyrifos is 43,430 (Kynetec USA, 2020, Table 2). While there may be a few more farms using chlorpyrifos on crops for which data are not available, this figure could also be an overestimate because farms that produce multiple crops may be counted multiple times for each of the crop surveyed.

According to data from the 2017 Census of Agriculture (USDA NASS, 2019), about 86% of farms using insecticides are "small" under the SBA definition. Using that percentage as a proxy for farms that apply chlorpyrifos and applying that percentage to the number of farms using chlorpyrifos in Table 2, EPA estimates that about 37,468 small farms could be affected by the revocation of tolerances for chlorpyrifos. This is an overestimate, because farms that use insecticides may not use chlorpyrifos, and because farms that produce multiple crops can be counted more than once in the pesticide use surveys.

Table 3 presents EPA's conclusions on the SISNOSE analysis. Of the 43,430 farms using chlorpyrifos, about 29,120 farms are estimated to be using it on crops where the impacts of the tolerance revocation are expected to be less than one percent of gross revenue (Table 2). Assuming that about 86% of farms that use chlorpyrifos are small, about 25,122 small farms are estimated to incur impacts of less than one percent of the farm's total gross revenue (Table 3). Impacts of less than 1% of gross revenue are not considered 'significant' under the criteria established above.

Impacts of between 1 – 3% of gross revenues may be significant. About 10,499 small farms are estimated to incur impacts between 1% and 3% of gross revenue per acre if upper-bound loss estimates are realized; this is about 0.75% of all small farms that produce crops (Table 3). Because the estimated number of small farms affected is less than 10% of all small farms, EPA finds that a substantial number of small entities will not face impacts between 1 and 3% of gross revenue.

The estimated number of farms with impacts between 1% and 3% is clearly an overestimate if farms grow multiple crops or also produce livestock, for example. If cost estimates as a percentage of gross revenue are overestimated, then the number of farms facing that impact is an overestimate. For example, the impact from revoking tolerances is about 1% of gross revenue per acre for onions, and there are about 240 onion producers using chlorpyrifos (see Table 2). If a farm producing onions using chlorpyrifos receives half of its gross revenue from other crops not treated with chlorpyrifos, then the cost as a share of total gross revenue for the farm is only about 0.5%. If half of the onion farms had revenue from other crops sufficient to bring cost as a share of gross revenue below 1%, then 120 onion farms would actually be in the lower impact category. The same is true for other crops, and for the farms with impacts above 3%. All of the estimates of impacts are based on high-end assumptions, so estimates of the number of farms affected are also biased upward.

About 1,846 small farms may see impacts greater than 3% of per-acre gross revenue at the upper range of losses (Table 3). This represents about 0.13% of all small farms growing crops. The previous section defined the thresholds for a substantial number of small farms; when more than 1,000 small farms face impacts above 3% of gross revenues, EPA does not consider there to be a substantial number of small farms affected if the total is less than 5% of all small farms. That is the case here, as only about 0.13% of small farms potentially have impacts above 3% (Table 3).

Table 3. Estimated Impacts of Chlorpyrifos Tolerance Revocation on Small Farms

Impact as Percentage of Gross Revenue per Acre	Number of All Farms Using Chlorpyrifos[1]	Small Farms Using Chlorpyrifos[2]	Percentage of All Small Farms[3]
< 1%	29,120	25,122	1.79%
1 - 3%	12,170	10,499	0.75%
>3%	2,140	1,846	0.13%
Total	43,430	37,468	2.66%

[1] See Table 2

[2] Based 86% of farms using insecticides are small

[3]Estimated number of small farms using chlorpyrifos divided by the total number of small farms producing crops (1,407,305).

Based on the criteria set forth in the previous section, EPA certifies that the revocation of the tolerances for chlorpyrifos will not have a significant impact on a substantial number of small entities. However, EPA acknowledges that some small farms, especially those without alternatives to chlorpyrifos, could face large per-acre impacts, as shown in Table 2.

Impact on Jobs

The revocation of food tolerances for chlorpyrifos will have a negligible impact on jobs. The jobs potentially affected are those of people who apply chlorpyrifos, those who work on farms where chlorpyrifos is used, and those who are in the industry manufacturing chlorpyrifos or selling the chemical.

In the first category are people who apply pesticides, such as professional pesticide applicators. For most crops there are alternative pesticides available to substitute for chlorpyrifos, and one or more applications of alternatives will be needed to replace those of chlorpyrifos. The application of alternative pesticides will be performed by the same people who apply chlorpyrifos today. In the few cases where there are not replacements, the impact on employment is still likely to be small, because even for pesticide applicators, applying chlorpyrifos is only a small part of their overall job applying pesticides. Because farms are not expected to cease farming because of the tolerance revocation, there will be no reduction in jobs for farmers, farmworkers, or pesticide handlers. As discussed above, chlorpyrifos is typically only applied to a subset of the crops grown on a farm, and even then, not necessarily on the full acreage of those crops. In extreme cases, growers may choose to change cropping patterns, but unless they cease farming altogether and do not sell the farm to someone else, there will be farm work and pesticide applications will continue.

For registrants and people who work manufacturing, transporting and selling pesticides, other pesticides will be substituted for chlorpyrifos, and these will also need to be manufactured, transported and sold to agriculture. Without chlorpyrifos, the need for other pesticides will increase, offsetting any potential jobs losses from ceasing manufacturing of chlorpyrifos. At most, there may be a shift in employment within the pesticide industry as employment manufacturing chlorpyrifos is offset by increases in jobs making other pesticides, possibly even within the same firm.

This means the most likely effect would be a shift in employment within the pesticide industry (possibly even within the same company). Other insecticides may be more or less labor intensive than chlorpyrifos in their production, but it seems unlikely that there will be a significant change in employment given that no single chemical will replace all chlorpyrifos usage.

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Appendix: Grower Revenue

EPA used data on area cultivated and value of production from the National Agricultural Statistics Service (NASS) of USDA to calculate average gross revenue per acre. A five-year (2010 – 2014) average is used unless recent price increases indicate substantially higher revenues currently.

Crop	Acres Harvested (Avg. Annual)	Gross Revenue (Avg. Annual)	Gross Revenue (Avg. Annual $ per acre)
ALFALFA	18,375,000	$10,038,403,600	$546
ALMONDS	822,000	$5,100,158,000	$6,205
APPLES	326,730	$2,892,088,600	$8,852
APRICOTS	11,404	$45,578,800	$3,997
ASPARAGUS	25,680	$86,513,000	$3,369
BEANS/PEAS (Dry)	1,533,180	989,730,200	$646
BEANS (Snap, Bush, Pole, String)	157,464	$249,372,100	$1,584
BROCCOLI[1]	124,920	$878,913,800	$7,036
CABBAGE[1]	57,434	$401,307,200	$6,987
CANOLA	1,400,560	$469,069,600	$335
CAULIFLOWER[1]	40,976	$396,934,600	$9,687
CELERY	28,580	$376,764,000	$13,183
CHERRIES (sweet)	87,378	$786,386,200	$9,000
CHERRIES (tart)	37,070	$74,307,600	$2,005
CORN (grain)	84,655,400	$66,043,095,400	$780
COTTON	9,274,520	$6,192,680,600	$668
CRANBERRIES	39,980	$314,384,800	$7,864
CUCUMBERS (fresh market)	39,980	$191,819,200	$4,877
CUCUMBERS (processing)	39,328	$174,862,000	$2,074
GARLIC	84,324	$255,807,200	$10,514
GRAPEFRUIT	24,330	$270,440,800	$3,731
GRAPES (raisin)	72,480	$792,405,000	$3,942
GRAPES (table)	201,000	$1,200,629,600	$11,435
GRAPES (wine)	105,000	$2,887,594,600	$4,876
HAZELNUTS	592,200	$94,470,000	$3,224
LEMONS	29,300	$454,421,000	$8,268
MINT	54,960	$191,789,600	$2,080
ONIONS	92,160	$919,155,000	$6,322
ORANGES (FL)	434,460	$1,456,223,400	$3,352
ORANGES (CA)	177,444	$759,065,600	$4,278
PEACHES	83,656	$493,190,600	$5,495
PEANUTS	1,261,020	$1,269,374,000	$1,007
PEARS	51,720	$416,869,800	$8,060

Crop	Acres Harvested (Avg. Annual)	Gross Revenue (Avg. Annual)	Gross Revenue (Avg. Annual $ per acre)
PEAS (Fresh/Green/Sweet)	179,700	$138,392,200	$770
PECANS (in shell)	4,938,401	$556,737,800	$1,127
PEPPERS (bell)	45,940	$589,605,400	$12,834
PEPPERS (chile)	20,920	$163,307,000	$7,806
PISTACHIOS	179,200	$1,389,330,000	$7,753
PLUMS / PRUNES	74,800	$272,710,000	$3,646
POTATOES	1,065,580	$3,990,486,000	$3,745
PUMPKINS	49,060	$133,716,800	$2,726
SORGHUM[1]	6,104,000	$1,497,555,800	$245
SOYBEANS	77,074,800	$40,578,872,000	$526
SQUASH	41,306	$218,161,600	$5,282
STRAWBERRIES	58,551	$2,507,214,000	$42,821
SUGARBEETS[1] (Except MN and ND)	498,260	718,550,000	$1,442
SUGARBEETS[1] (MN and ND)	627,400	693,810,400	$1,106
SUNFLOWER	1,629,260	$572,820,200	$352
SWEET CORN (fresh market)	223,326	$734,824,200	$3,290
SWEET CORN (processing)	330,912	$312,695,800	$945
SWEET CORN (combined)	554,238	$1,047,520,000	$1,890
TOBACCO	346,564	$1,471,710,200	$4,247
TOMATOES (fresh market)	100,302	$1,125,381,200	$11,220
TOMATOES (processing)	283,220	$1,093,076,600	$3,859
WALNUTS	272,000	$1,520,686,000	$5,591
WATERMELON	120,988	$488,717,800	$4,039
Wheat (Spring)	13,978,000	$4,377,700,800	$313
Wheat (Winter)	32,631,000	$9,772,478,200	$299

Sources: USDA NASS, 2010 – 2014
[1] USDA NASS, 2014 – 2018