SLEEPER SEED: HOW PALMER AMARANTH INFILTRATED AMERICA'S HEARTLAND

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I. INTRODUCTION

When most people think of a potential invasion of the United States, they usually fear a foreign power using bombs to destroy our country's resources or using troops to infiltrate our borders. What people do not know is the threat is already invading, part of nature, and smaller than an ant. Much like a troop invasion, this threat spreads across the country taking over land and wreaking economic, legal, and environmental havoc. This threat is Palmer amaranth. In fact, the Weed Science Society of America has voted Palmer amaranth as "the most troublesome weed in the U.S."[1] Palmer amaranth is an invasive species threatening agriculture and the American economy.

This Note will offer a discussion on the potentially disastrous effects of Palmer amaranth in America's heartland. First, this analysis will provide foundational information about what constitutes an invasive species. Second, this Note will discuss general background information about Palmer amaranth,

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1. Jonathan Knutson, *Dangerous Invader: Weed Known as Palmer Amaranth Reaches Upper Midwest*, DULUTH NEWS TRIB. (May 29, 2017), https://perma.cc/V7BS-VAWP.

including why Palmer amaranth is an invasive species, and why it is such a threat. Then, this analysis will illustrate how Palmer amaranth is spread, and how it has spread into the Midwest, Iowa in particular. The following section will provide an in-depth examination of the spread of Palmer amaranth into Iowa through contaminated Conservation Reserve Program (CRP) plantings.

Next, the discussion of the Palmer amaranth threat will be backed up by specific facts and examples of why we should care about it. Then, possible methods of containment and management of Palmer amaranth will be debated. Finally, this analysis will conclude by discussing consequences of the Palmer amaranth CRP crisis, and what lessons society, specifically Iowa, can learn from the issue, using Minnesota as a case study.

Since the Palmer amaranth issue is relatively new, there are some limitations to this analysis. First and foremost is the fact that farmers have not yet filed lawsuits against the State of Iowa. Thus, this analysis hypothesizes different avenues people affected by the Palmer amaranth issue, especially CRP owners, may pursue in filing different types of lawsuits against the state government. Another issue is there are not many concrete numbers to represent the lost profits or crop yields of Iowa farmers, so the numbers used in this analysis are mostly predictions of the losses farmers could suffer.

In spite of these limitations, this analysis is meant to serve as a warning of how the Palmer amaranth issue must be better addressed by the State of Iowa than it currently is, or the results will be disastrous. This Note can also be used as an informational piece on Palmer amaranth to help local farmers identify if Palmer amaranth is in their fields, and provide access to different resources available to affected farmers. Most importantly, this analysis can serve as a warning beacon for how Iowa's government must act in a stronger, more decisive manner the next time an invasive species invades or threatens our State.

II. WHAT IS AN INVASIVE SPECIES?

Invasive species have been defined by Executive Order 13112 as any species that is "1) non-native (alien) to the ecosystem under consideration and 2) whose introduction causes or is likely to cause economic or environmental harm to human health."[2] Furthermore, the United States Department of Agriculture (USDA) stated, "[i]nvasive species can be plants, animals, and other organisms (*e.g.*, microbes). Human actions are the primary means of invasive species introductions."[3] According to Executive Order 13112, "[i]ntroduction means the intentional or

2. *See About NSIC*, USDA, https://perma.cc/AEK4-LC2B (archived Sept. 23, 2018).
3. *Id.; see also* Invasive Species, 64 Fed. Reg. 6183 (Feb. 8, 1999).

unintentional escape, release, dissemination, or placement of a species into an ecosystem as a result of human activity."[4]

III. BACKGROUND ON PALMER AMARANTH

A. What is Palmer Amaranth?

The USDA describes Palmer amaranth as a "problematic annual broadleaf weed in the amaranth genus."[5] Palmer amaranth goes by other names, such as "carelessweed, dioecious amaranth, Palmer's amaranth, palmer amaranth and Palmer's pigweed."[6] A less scientific name farmers and agricultural professors call Palmer amaranth is Satan.[7] For the sake of clarity and consistency, this analysis will refer to this invasive weed as "Palmer amaranth."

B. How did Palmer Amaranth get to the Midwest and Why is it a Threat to the Midwest?

Palmer amaranth is "native only to the Southwest," and is an invasive weed in the rest of the country.[8] However, instead of staying in its native Southwest region, Palmer amaranth has spread throughout the country wreaking havoc as it goes.[9] This spread from the Southwest to Midwestern states such as Wisconsin, Illinois, Minnesota, and Iowa has likely occurred within the past decade.[10] Given how easily and rapidly Palmer amaranth spreads, it is fair to wonder why this movement into the Midwest did not occur sooner.

A variety of traits have helped Palmer amaranth spread and become a threat to the Midwest, such as: its rapid growth rate; its extended germination and emergence window; its ability to exist in less than ideal weather conditions; the large number of seeds it produces; and the size of its seeds.[11] These traits, plus

4. Invasive Species, 64 Fed. Reg. at 6183.

5. U.S. DEP'T AGRIC., PALMER AMARANTH (2017), https://perma.cc/32FG-HV3K.

6. *Id*.

7. Gil Gullickson, *Palmer Amaranth: Bedeveling Farmers like No Other Weed*, SUCCESSFUL FARMING (Apr. 5, 2017), https://perma.cc/3RGC-5VAN.

8. U.S. DEP'T AGRIC., *supra* note 5.

9. Sarah M. Ward et al., *Palmer Amaranth (Amaranthus palmeri): A Review*, 27 WEED TECH. 12, 12 (2013); U.S. DEP'T AGRIC., *supra* note 5.

10. Kevin Bradley, *Palmer Amaranth is Still on the Move in Missouri*, INTEGRATED PEST MGMT. (Aug. 17, 2016), http://perma.cc/GN7R-NTZ9; Lisa Behnken et al., *Palmer amaranth: A New Weed Threat to Watch out for*, MINN.CROP NEWS (Aug. 23, 2016), https://perma.cc/U923-3Q63.

11. Ward, *supra* note 9, at 12; U.S. DEP'T AGRIC., *supra* note 5; *see* Bradley, *supra* note 10; Behnken et al., *supra* note 10.

others, have coalesced to make Palmer amaranth one of the most aggressive, competitive, and hard to control weeds in the country.[12]

These traits also explain how once Palmer amaranth spreads to a new area; it can take over that area from the plants that existed there beforehand. For example, Palmer amaranth has an extremely fast growth rate at around 2-3 inches per day.[13] Furthermore, adult Palmer amaranth plants can reach heights of 6-8 feet.[14] As a result of this fast growth rate and maximum plant height, Palmer amaranth stifles the growth of surrounding plants by depriving the surrounding plants of space, sunlight, and nutrients.[15] Additionally, Palmer amaranth has an extended germination and emergence window and can exist in less than ideal climates.[16] This means that once Palmer amaranth seeds are deposited into an area, the "[s]eeds can lie dormant for years, waiting to germinate until growing conditions are favorable."[17] To make matters worse, Palmer amaranth has been proven to be particularly adept at becoming resistant to certain herbicides.[18] Consequently, new ways of eradication and containment must be constantly introduced in an attempt to limit the spread of Palmer amaranth.[19]

Palmer amaranth poses a unique threat from other competitive weeds because Palmer amaranth "produces inordinate amounts of seed—often more than 400,000 per plant."[20] Other researchers found that a single Palmer amaranth plant can produce up to 1 million seeds.[21] Furthermore, since Palmer amaranth seeds are incredibly small, the seeds can be spread very easily and unintentionally by a plethora of different carriers.[22]

Palmer amaranth has spread from the Southwest to the Midwest through animals, used farm equipment, contaminated feed, contaminated grain, manure, and, most recently, contaminated seed.[23] Indeed, Palmer amaranth seeds could be

12. Ward, *supra* note 9, at 12.
13. U.S. DEP'T AGRIC., *supra* note 5.
14. *Id*.
15. Orlan Love, *Invasive Palmer Amaranth in Half of Iowa Counties*, GAZETTE (Jan. 9, 2017), https://perma.cc/JPN7-7BU4.
16. U.S. DEP'T AGRIC., *supra* note 5.
17. Knutson, *supra* note 1.
18. Behnken et al., *supra* note 10.
19. *Id*.
20. Love, *supra* note 15 (quoting Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University).
21. Knutson, *supra* note 1.
22. *Id*.
23. Bradley, *supra* note 10; Behnken et al., *supra* note 10.

transported without the carrier's knowledge from the Southwest to the Midwest on the bottom of a farmer's boot, the treads of a tractor's tire, or the migration of waterfowl.[24]

IV. IOWA'S CRP ISSUE

In Iowa, and the Midwest as whole, the spread of Palmer amaranth through contaminated seed found in "newly-seeded conservation plantings (CRP/wildlife/pollinator/and cover crop plantings)" poses the most significant legal question—who is responsible?[25]

Before answering the culpability question, it is necessary to first look at what CRPs are and why the contaminated CRPs created significant legal and economic threats to Iowa farmers. First, a CRP, or a Conservation Reserve Program, is "a land conservation program administered by the Farm Service Agency (FSA)."[26] The USDA describes the functioning of a CRP as follows: "[i]n exchange for a yearly rental payment, farmers enrolled in the program agree to remove environmentally sensitive land from agricultural production and plant species that will improve environmental health and quality."[27] Additionally, CRPs typically last 10-15 years.[28]

Ever since President Ronald Regan signed CRPs into law, they have been successful by "improv[ing] water quality, reduc[ing] soil erosion, and increas[ing] habitat for endangered and threatened species."[29] Increasing such a habitat for endangered and threatened species is what the contaminated CRPs in question were intended to do.[30] Specifically, the contaminated CRPs at issue here were intended to help the spread of butterflies and other pollinators. [31]

Now, it is necessary to examine how these CRPs became contaminated. According to many researchers, including Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University, the CRPs became infested with Palmer amaranth through the use of a contaminated seed mixture.[32] In short,

24. Knutson, *supra* note 1; Bradley, *supra* note 10.

25. Behnken et al., *supra* note 10.

26. *Conservation Reserve Program*, USDA, https://perma.cc/5VCQ-4WX2 (archived Sept. 23, 2018).

27. *Id*.

28. *Id*.

29. *Id*.

30. Love, *supra* note 15.

31. *Id*.

32. *Id*.

the government recommended a certain seed mixture for CRP farmers to use in their pollinator habitats, and these seed mixtures contained Palmer amaranth seeds.[33] Unfortunately, the use of these contaminated seed mixtures was a direct result of the success and increased use of CRPs in Iowa.

According to Professor Hartzler, "Iowa had considerably more CRP acres than any other state last year, up to 200,000 new acres, and that increase in demand for native seeds overwhelmed local seed producers."[34] Furthermore, the Palmer amaranth problem in Iowa was especially potent compared to other Midwestern states because "[d]uring 2016, 64,000 acres of pollinator habitat mix were planted in Iowa, which compares to 20,000 acres in Illinois and just 1,500 acres in Minnesota."[35] Specifically, many counties in Iowa had about 100 to 200 fields that were a part of a CRP program, such as the aforementioned pollinator habitat program. [36]As a result of increased demand for CRP seed and pollinator habitat seed, Iowa's "local seed producers had to source out of state and that's where we think Palmer came in."[37]

There are a few things to keep in mind regarding these contaminated seed mixtures. First, most of the seed production was outsourced to more southern states, such as Texas and Kansas, where Palmer amaranth is widespread and a native seed.[38] Second, "[f]ederal labels don't require native seed providers to list what weed seeds are present."[39] One of the reasons federal labels do not require such information is because some seeds are very difficult to differentiate because "there is no definitive DNA test."[40] Instead, "[s]eed companies and growers who provide native seed mixes have to rely on physical identification when checking seed lots for contamination."[41] Differentiating seeds based on minute physical

33. Interview with Neil Hamilton, Dir. for the Agric. Law Ctr, Drake Univ. Law Sch., & Matthew Russel, Resilient Agric. Coordinator, Drake Univ. Law Sch., in Des Moines, Iowa (2016).

34. Sonja Begemann, *Watch for Palmer Amaranth Hiding in CRP Plantings*, AGWEB 2 (Jan. 25, 2017), https://perma.cc/G4TR-ZSPY (quoting Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University).

35. Love, *supra* note 15 (quoting Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University).

36. Lynn Betts, *Palmer Explodes into Iowa*, CORN & SOYBEAN DIG. (Jan. 20, 2017), https://perma.cc/4ZNV-EKKV.

37. Begemann, *supra* note 34 (quoting Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University).

38. Betts, *supra* note 36; Love, *supra* note 15; Begemann, *supra* note 34.

39. Begemann, *supra* note 34.

40. *Id*.

41. *Id*.

differences would be a time consuming and inefficient task, so that is likely another reason why federal labels do not require such information.

Furthermore, when these contaminated seed mixtures were used, Palmer amaranth was not listed as a noxious weed under Iowa law.[42] Therefore, Palmer amaranth's "inclusion in conservation seed mixes would not be illegal."[43] Researchers at the University of Illinois found a source of one of these contaminated seed mixtures, a Midwestern company's pollinator habitat seed.[44] Interestingly, the company claimed its seed was "100 percent weed free."[45] Researchers refused to release the name of this company but have said that it "is one of dozens of companies that sells seed mixes used in the U.S Department of Agricultural Habitat Initiative and Conservation Reserve Program."[46] No lawsuits have been filed, but this "100 percent weed-free" tag could provide an avenue for legal action under contract law dealing with warranties in the future.

Now that a major source of Palmer amaranth in Iowa has been discussed, it is necessary to see how far Palmer amaranth has spread throughout Iowa to forecast the economic, legal, and environmental threats. In the beginning of 2016, only about five of Iowa's ninety-nine counties were infested with Palmer amaranth.[47] At the end of 2016, about forty-nine of the ninety-nine counties were infested with Palmer amaranth.[48] By the end of 2017, Palmer amaranth is predicted to be in eighty of the ninety-nine counties—possibly even in all of Iowa's counties.[49] The following graph further illustrates the spread of Palmer amaranth into Iowa counties as of until August 2017.

42. Love, *supra* note 15.

43. *Id*.

44. Diana Yates, *Pollinator Habitat Program Spreads Bad Seeds with the Good*, ILL. NEWS BUREAU (Dec. 7, 2016), https://perma.cc/ZBK5-TMXX.

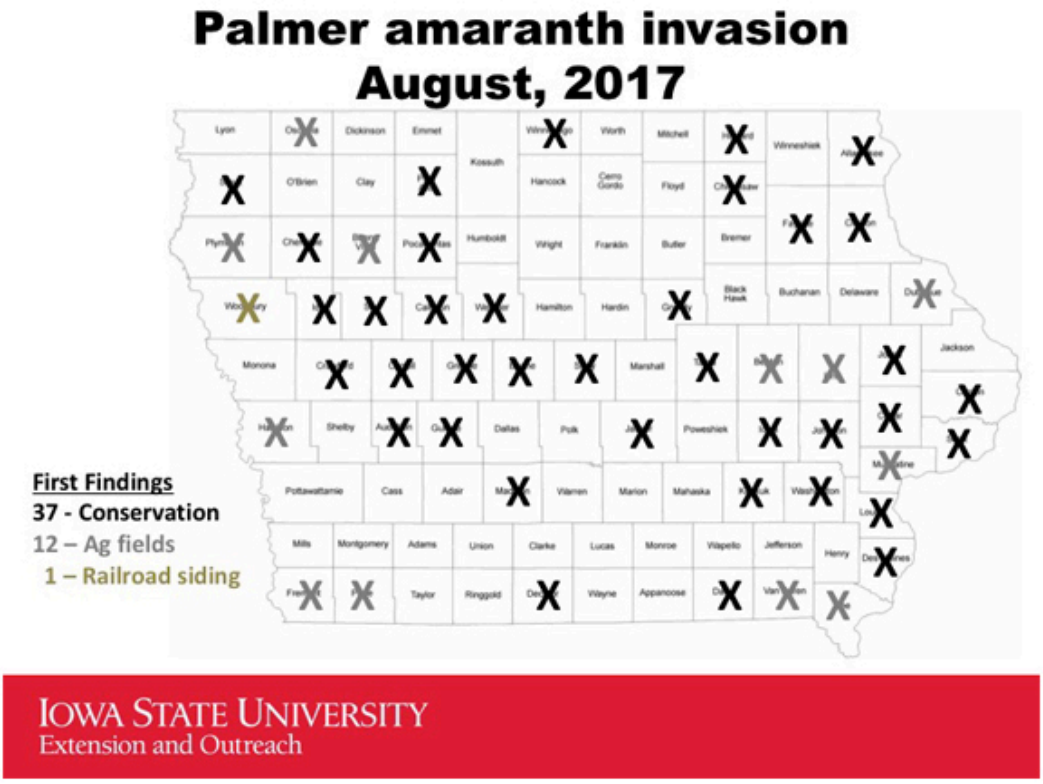
45. *Id*.

46. *Id*.

47. Love, *supra* note 15 (citing Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University).

48. *Id*. (citing Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University).

49. *Id*. (citing Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University).



[50]

The dramatic increase in the number of Iowa counties where Palmer amaranth has been found demonstrates the aggressive, competitive, and fast-spreading nature of Palmer amaranth discussed earlier in this analysis. This begs two questions: first, can Palmer amaranth be stopped, or at least managed or contained; second, and most importantly, why do we care if Palmer amaranth remains prevalent in Iowa?

V. MANAGEMENT OF PALMER AMARANTH IN IOWA

Once Palmer amaranth has settled into and taken over an area of land, as it

50. *See* Bob Hartzler & Joel DeJong, *Add Osceola County to the Map – Increased Vigilance Needed*, IA STATE UNIV. (Aug. 16, 2017), https://perma.cc/6SRR-H4FM.

has throughout Iowa, it is difficult, if not impossible, to eradicate.[51] According to Professor Hartzler, "[a]lthough Palmer amaranth has been introduced to too many fields in Iowa to expect statewide eradication, it is not unrealistic to eliminate it from individual fields."[52] Even though it may seem like all hope is lost for Iowans in their battle against Palmer amaranth, there are a number of key reasons for Iowans to continue the fight. First, while it's not likely that Palmer amaranth could be completely eradicated in Iowa, its spread throughout the state can be stopped.[53] Second, Palmer amaranth can likely be eliminated from certain fields.[54] Third, Iowa and other states can use this Palmer amaranth battle as a lesson on how to deal with invasive species now and into the future.[55]

Now that it has been established that Palmer amaranth is probably too entrenched in Iowa to be completely eradicated statewide, it is necessary to discuss how Iowans can eradicate it in certain fields to contain and stop the spread of this threat. According to a multitude of sources, the key ways to manage and contain Palmer amaranth are: early identification,[56] communication,[57] and preventing new introductions.[58] However, most of these management tools are difficult to implement, either because of governmental restrictions or because of certain Palmer amaranth traits.[59]

Identification is one of the first steps farmers need to take to prevent the spread of Palmer amaranth and to possibly eliminate it from individual fields.[60]

51. Betts, *supra* note 36.

52. Bob Hartzler, *Update on Palmer Amaranth in Conservation Plantings*, IA STATE UNIV. (May 1, 2017), https://perma.cc/8BTC-7G9C.

53. Betts, *supra* note 36.

54. Hartzler, *supra* note 52.

55. Knutson, *supra* note 1; Peter Scharpe, *Eradication Efforts for Palmer Amaranth Proving Effective,* AGUPDATE (Sept. 13, 2017), https://perma.cc/E7KR-C63H (Minnesota provides an example of a state learning from Iowa's mistakes in the battle against Palmer amaranth.).

56. *Diligent Management Still Key to Avoid Spread of Palmer Amaranth in Iowa Fields*, MAPLETON PRESS (Sept. 15, 2017), https://perma.cc/32VE-VXSH [hereinafter *Diligent Management*]; *How to Avoid Palmer Amaranth Problems*, WALLACESFARMER (Sept. 15, 2017), https://perma.cc/LM3X-SZWH; Knutson, *supra* note 1; Betts, *supra* note 36.; U.S. DEP'T AGRIC., *supra* note 5.

57. U.S. DEP'T AGRIC., *supra* note 5.

58. Betts, *supra* note 36 (citing Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University).

59. Betts, *supra* note 36 (quoting Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University); *Diligent Management*, *supra* note 56; Knutson, *supra* note 1.

60. *Diligent Management*, *supra* note 56; Knutson, *supra* note 1.

However, due to Palmer amaranth's resemblance to other less threatening weeds, such as waterhemp, identification is difficult.[61] Alan Lange, a resource conservationist with the USDA Natural Resources Conservation Service in Des Moines, Iowa, outlined how farmers should attempt to identify Palmer amaranth in their fields: "[f]armers and landowners should actively search for Palmer in crop fields, borders, ditches, conservation lands and hay feeding locations."[62] According to Lange, "[f]armers should also frequently monitor areas where control measures have been taken to determine if regrowth or new emergence of Palmer has occurred on the site and use follow-up treatments to control any surviving or new growth."[63] The USDA has listed several traits of Palmer amaranth to help identify the weed, they are as follows:

> [1] Palmer amaranth is a summer annual that commonly reaches heights of 6—8 feet, but can reach 10 feet or more.
>
> [2] Green leaves are smooth and arranged in an alternative pattern that grows symmetrically around the stem. Leaves are oval to diamond-shaped. There is a small, sharp spine at the leaf tip. Some Palmer amaranth leaves have a whitish V-shaped mark on them. Not all plants display this characteristic.
>
> [3] There are separate male and female plants.
>
> [4] Palmer amaranth looks similar to other pigweeds such as common waterhemp, redroot, and smooth pigweeds.
>
> [5] Redroot and smooth pigweeds have fine hairs on their stems and leaves. Palmer amaranth and waterhemp do not have these hairs.
>
> [6] The stalk connecting a leaf to the stem of Palmer amaranth is longer than the length of the leaf. For common waterhemp, the stalk connecting a leaf to the stem will only be half the length of the leaf.
>
> [7] Seedhead spikes on female Palmer amaranth plants are much taller, up to 3 feet long, and more prickly than waterhemp, redroot and smooth pigweed

61. *Diligent Management*, *supra* note 56, (citing Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University); Knutson, *supra* note 1 (quoting Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University).

62. *Diligent Management*, *supra* note 56 (quoting Alan Lange, Resource Conservationist with the USDA Natural Resources Conservation Service in Des Moines, Iowa).

63. *Id*. (quoting Alan Lange, Resource Conservationist with the USDA Natural Resources Conservation Service in Des Moines, Iowa).

> spikes. Palmer flower heads are sharp and prickly to the touch with bare hands.[64]

Additionally, since Palmer amaranth can lie dormant for years before sprouting from the seeds, farmers may not even know their fields are infested with this invasive species before it is too late.[65] In fact, the problem of farmers not knowing their fields are infested with Palmer amaranth is such a common issue that Professor Hartzler filed a Freedom of Information Act request in order to ascertain what farmers and farms had CRP contracts in order to warn the farmers of the potential threat.[66]

Once Palmer amaranth has been identified in a farmer's field, the government encourages communication between the farmer and county agents to find the best course of action for the farmer to take.[67] Once communication has occurred, Iowa recommends several controls that farmers with CRP agreements may take:

> [1] First consider the use of spot treatments and methods that will establish and maintain as much of the seeded prairie plants as possible.
>
> [2] Palmer thrives in open spaces and areas of soil disturbance that lack plant competition; so avoid tillage for several years in locations where Palmer is present.
>
> [3] Broadcast herbicide applications are only available on CRP contract acres certified to have 100 or more Palmer amaranth plants present.
>
> [4] Avoid the spread of palmer amaranth seed by cleaning boots, shoes and pants with a stiff brush before leaving the site. Avoid driving a vehicle (truck, ATV or UTV) through fields infected with Palmer. Clean equipment such a tractors, mowers and vehicles of all soil, seeds and plant material before leaving the site.[68]

Many times, industry-industry-recommended methods of dealing with Palmer amaranth are not enough to eradicate the invasive species.[69] More

64. U.S. DEP'T AGRIC., *supra* note 5.

65. Betts, *supra* note 36 (quoting Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University).

66. *Id*. (quoting Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University).

67. U.S. DEP'T AGRIC., *supra* note 5.

68. *Diligent Management*, *supra* note 56.

69. Knutson, *supra* note 1.

successful and potent steps that can be used to stop the spread of and possibly eliminate Palmer amaranth in certain fields include constantly changing herbicides used to treat the crops (new herbicides are being developed to specifically combat Palmer amaranth[70]), diversifying types of crop rotations, elongating crop rotations, and making narrow row spaces between the different crops all help to combat Palmer amaranth.[71]

According to Professor Neil Hamilton and Matthew Russell, Resilient Agricultural Coordinator, both of Drake University Law School, many Iowa farmers that have CRPs have taken the recommended steps of correctly identifying Palmer amaranth in their fields and communicating the issue to the government.[72] However, in order to eliminate Palmer amaranth from their fields, these farmers want more options than are currently available under their CRP agreements.[73]

In most instances, farmers need further alternatives to stop the spread of Palmer amaranth in order to save the other crops in their fields and to avoid the spread of Palmer amaranth to neighboring fields and crops.[74] One common request is for the government to permit a farmer to terminate their CRP agreement without paying a termination fee or penalty fees, allowing the farmers to take more successful steps in eradicating Palmer amaranth from their fields and stop its spread.[75] Another request is for the government to allow farmers to keep the CRP agreement in place but enable them to use more options to eliminate the Palmer amaranth than they are currently allowed to under the CRP agreement.[76]

Farmers are not the only ones who want more options to attempt to eradicate Palmer amaranth from Iowa. Bill Northey, Iowa's former Secretary of Agriculture, "wants [the] USDA to allow farmers and landowners to use spot herbicides in conservation pollinator habitats to kill Palmer amaranth."[77] In other words, the state of Iowa also wants Palmer amaranth to be contained, but its hands may be tied at the federal level by the USDA's restrictions on CRPs.

70. Zacks Equity Research, *DuPont Launches ExerpreX Soybean Herbicide to Protect Crops*, ZACKS (Aug. 30, 2017), https://perma.cc/C3HA-BVH4.

71. Knutson, *supra* note 1(citing Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University and Gared Shaffer, Weeds Field Specialist with South Dakota State University Extension).

72. Interview with Neil Hamilton & Matthew Russel, *supra* note 33.

73. *Id*.

74. *Id*.

75. *Id*.

76. *Id*.

77. Donnelle Eller, *Invasive 'Super Weed' Spreads through Iowa*, DES MOINES REG. (Jan. 3, 2017), https://perma.cc/B9AJ-DS7G.

This CRP issue between Iowa farmers and the government presents a few interesting legal issues. First, if the farmers are not able to get out of the CRP agreement and the Palmer amaranth destroys the farmers' other crops, must the government pay for these losses, or should the farmers bear the costs? Second, if Palmer amaranth spreads to neighboring fields, are the farmers liable, or is the government? These legal issues are made even more perplexing because in many cases the government recommended the seed mixtures that contained Palmer amaranth to be used in the CRPs.[78] However, Iowa claims it is not liable since Palmer amaranth was not listed as a noxious weed until after it infiltrated and spread throughout the state.[79]

These potential legal issues are currently unknown since no lawsuits have been filed against the State of Iowa or the seed producers that sold the seed mixtures contaminated with Palmer amaranth. However, both government officials and private actors say "the added costs farmers and landowners run into fighting Palmer amaranth could spark a rash of lawsuits."[80] This lack of legal action might be because the Palmer amaranth problem, while widespread and very destructive, is still relatively new.

Unfortunately, things may have to get much worse in Iowa for there to be any legal challenges. By that point, Palmer amaranth may have too strong of a hold on Iowa's farmlands for containment or management actions to be effective. Even though the affected farmers have yet to take legal action, Iowa has not remained silent on the issue. [81]

VI. WHAT HAS IOWA DONE SO FAR?

Before discussing the action Iowa has taken, it is important to remember the Palmer amaranth problem was first noticed in early 2016 and caused mostly by the introduction of contaminated seed mixtures used in CRPs.[82] Additionally, the government recommended a certain seed mixture to CRP farmers to use in their pollinator habitats, and these seed mixtures contained Palmer amaranth seeds.[83]

By looking at this CRP process, it is clear that Iowa's government played a key role. It follows that the government also played a major role in the widespread and prevalent introduction of Palmer amaranth into many of Iowa's counties. Thus,

78. Yates, *supra* note 44.
79. Eller, *supra* note 77.
80. *Id*.
81. Hartzler, *supra* note 52.
82. *Id*.
83. Interview with Neil Hamilton & Matthew Russel, *supra* note 33.

it is fair to wonder why the government waited so long to respond to the Palmer amaranth issue. However, in the spring of 2017, Iowa began to address the Palmer amaranth problem.[84]

First and most importantly, on April 21, 2017, Governor Branstad signed a bill adding Palmer amaranth to Iowa's noxious weed law.[85] This law went into effect in the beginning of July 2017, and gave the government a position of authority in containing and managing the Palmer amaranth problem.[86] More specifically, "[t]he bill requires that landowners get approval of the Farm Service Agency (FSA) before implementing control strategies in CRP."[87] Listing Palmer amaranth as a noxious weed was a long-awaited step by government and private actors alike.[88] This is because once a weed is listed as a noxious weed, the law "prevent[s] noxious seed from entering the state, and the weed law could give farmers, landowners and others more tools to fight its spread."[89]

Second, "[t]he Natural Resources and Conservation Service (NRCS) has developed a webpage providing information regarding Palmer amaranth in CRP."[90] This webpage discusses methods of management and control of Palmer amaranth in CRP areas.[91] Furthermore, the webpage says there may be government money available to help the CRP issue and, in drastic situations, individuals with CRPs may be able to terminate their contract.[92] In order to take advantage of this government funding, the Palmer amaranth "infestation must be confirmed in writing by another person, likely a farmer's neighbor."[93] Neighbors of Palmer amaranth infested fields should jump at this opportunity to prevent the spread of Palmer amaranth to their fields.

The dynamic between Palmer amaranth being added to Iowa's noxious weed law and the NRCS webpage is interesting. "Iowa's noxious weed law specifically states that if Palmer is found on CRP areas, the CRP rules cannot be violated to control the weed;" while the NRCS webpage discusses the possibility of a CRP termination.[94]

84. Hartzler, *supra* note 52.
85. *Id*.
86. *Id*.
87. *Id*.
88. Eller, *supra* note 77.
89. *Id*.
90. *See generally* Hartzler, *supra* note 52
91. *Id*.
92. *Id*.
93. Eller, *supra* note 77.
94. *Diligent Management*, *supra* note 56; Hartzler, *supra* note 52.

Unfortunately, the fact that farmers cannot violate the terms of their CRPs while eradicating Palmer amaranth from their fields means that adding Palmer amaranth to Iowa's noxious weed list may not be as significant of a step by the State as originally thought. This is because farmers and researchers alike, agree that more drastic measures are needed than CRPs currently allow farmers to try to rid their land of the Palmer amaranth infestation.[95] However, from the NRCS webpage, it appears that in extreme situations, individuals with CRP contracts may be able to terminate their contract to try to eradicate Palmer amaranth from their land.[96]

Hopefully, the government will actually allow people to terminate their CRP agreements as the NRCS webpage states—because most of the recommended management and containment methods such as mowing and weeding by hand—while somewhat effective at slowing the spread of Palmer amaranth, are ineffective at eliminating it from the land.[97]

VII. WHY DO WE CARE?

Put quite simply, why should we as Iowans even care about this Palmer amaranth issue? The potential economic costs of Palmer amaranth can cause higher control costs, reduced yields, and compromise harvest efficiency.[98] Specifically, "Palmer amaranth threatens the state's grain production, which generated $13.1 billion in sales in 2015. That grain is often used to feed pigs, cattle, laying hens and other livestock, which provided $14.7 billion in receipts."[99] Farmers feel the disastrous economic effects of Palmer amaranth from "both higher control costs and reduced yields."[100] Specifically, in regard to the potential yield loss, "[s]oybean yield losses approaching 80% and corn yield losses exceeding 90% have been reported in the peer-reviewed scientific literature."[101]

In a Duluth News Tribune article, Tom Peters, an Extension Sugar Beet Weed Specialist for North Dakota State University and the University of

95. Betts, *supra* note 36; Interview with Neil Hamilton & Matthew Russel, *supra* note 33.

96. Hartzler, *supra* note 52.

97. Betts, *supra* note 36 (citing Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University); Hartzler, *supra* note 52.

98. Ward, *supra* note 9, at 18; Knutson, *supra* note 1.

99. Eller, *supra* note 77.

100. Knutson, *supra* note 1 (quoting Tom Peters, Extension Sugar Beet Weed Specialist for North Dakota State University and the University of Minnesota).

101. Pam Smith, *Corn Belt: Palmer Pigweed Turning Up in CRP Acres—DTN*, AGAX (Aug. 10, 2016), https://perma.cc/V7W9-C97L.

Minnesota, provided an example to illustrate the potential higher costs Palmer amaranth could cause.[102]

> [A]ssume[] a North Dakota soybean field that potentially would produce 50 bushels an acre that would sell for $8.50 per bushel. [1] If Palmer amaranth is present in the field, the cost of weed control is $65 per acre—triple the $21 per-acre cost of controlling weeds if Palmer amaranth isn't there. [2] If the weed isn't in the field, and yields don't suffer, the farmer will enjoy a return of $425 per acre. If Palmer amaranth is present, however, yields will tumble and the producer's return will be just $89 per acre.[103]

A lost profit of $336 per acre is an enormous loss for farmers and demonstrates the drastic consequences of Palmer amaranth.[104] Other studies have found that losses could reach "[a]bout $710 an acre for corn and $545 an acre for soybeans, based on Iowa cash prices and last year's average yields."[105]

However, higher costs and reduced yields are not the only economic consequences of Palmer amaranth.[106] Palmer amaranth also compromises harvest efficiency, like in cotton harvests.[107] This compromise of harvest efficiency is the result of a drastic increase of work stoppages that occur when Palmer amaranth is prevalent in a field.[108] These work stoppages are necessary "to dislodge thick Palmer amaranth plant stems from harvest equipment."[109] As a consequence of these work stoppages, "[t]he presence of Palmer amaranth increased harvest time between two- to four-fold, relative to the weed-free control."[110] Other research has found that "mechanical harvest was impractical because of potential equipment damage once Palmer amaranth densities were in excess of 0.65 plants m^{-2} (six plants $9.1m^{-1}$ row)."[111] This increased production time and inability to use mechanical equipment

102. Knutson, *supra* note 1 (quoting Tom Peters, Extension Sugar Beet Weed Specialist for North Dakota State University and the University of Minnesota).

103. *Id*. (quoting Tom Peters, Extension Sugar Beet Weed Specialist for North Dakota State University and the University of Minnesota).

104. *Id*. (quoting Tom Peters, Extension Sugar Beet Weed Specialist for North Dakota State University and the University of Minnesota).

105. Eller, *supra* note 77.

106. *See* Knutson, *supra* note 1 (generally other costs included are lost efficiency and higher cost of weed).

107. Ward, *supra* note 9, at 18.

108. *Id*.

109. *Id*.

110. *Id*.

111. *Id*.

also adds to the increased costs of producing and harvesting crops from a field infested with Palmer amaranth.

These economic effects demonstrate why more extreme measures than the government is currently allowing most CRPs are necessary to contain Palmer amaranth. Minnesota's government demonstrates how extreme measures are more successful at containing and even eradicating the threat of the noxious weed.[112]

One of the reasons Minnesota has been so successful at containing Palmer amaranth is because its government's ability to see how the problem unfolded in Iowa. Unlike Iowa, Minnesota wanted to "eradicate the weed, not just control it."[113] Instead of waiting to act, Minnesota's government, in conjunction with local farmers and researchers, immediately addressed the problem.[114] Minnesota also acted in a much stronger way than Iowa, allowing its farmers to take more extreme measures to eradicate Palmer amaranth before it could spread throughout the state.[115]

Like Iowa, Minnesota has placed Palmer amaranth on its noxious weed list.[116] However, Minnesota immediately listed Palmer amaranth as a noxious weed and an "[e]radicate" weed, meaning "landowners must attempt to eradicate any Palmer amaranth found by destroying all the above and below ground parts of the plants."[117] As a result, "Minnesota is likely to reap large dividends by minimizing the future establishment, spread, and economic impact of the weed. It (listing it) would have saved a lot of trouble in Iowa."[118]

Some of the other aggressive steps Minnesota has taken to avoid the drastic problems that have plagued Iowa as a result of the Palmer amaranth issue are: hiring a "full-time person focused completely on Palmer," working with farmers and the University of Minnesota to identify Palmer amaranth in farmers' fields, and using blow torches to eradicate the weed.[119] Anthony Cortilet, a noxious weed coordinator at the Minnesota Department of Agriculture, said, "[b]urning the plant

112. Behnken et al., *supra* note 10; Scharpe, *supra* note 55.

113. Eller, *supra* note 77 (quoting Anthony Cortilet, a noxious weed coordinator at the Minnesota Department of Agriculture); Scharpe, *supra* note 55.

114. Scharpe, *supra* note 55.

115. *Id*.

116. Behnken et al., *supra* note 10; Scharpe, *supra* note 55

117. Behnken et al., *supra* note 10; *see also* Scharpe, *supra* note 55.

118. Gullickson, *supra* note 7 (quoting Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University).

119. Eller, *supra* note 77; Scharpe, *supra* note 55.

signals to farmers the importance of stopping the weed . . . [t]hey think we're absolutely insane, and they couldn't be happier that we are."[120]

VIII. CONCLUSION

Monetary figures are useful to represent the great economic costs and the disastrous effects of Palmer amaranth. Looking at real-life stories from affected Iowans truly demonstrates the economic, legal, and environmental destruction that Palmer amaranth has brought to Iowa. Many of these affected farmers wanted to take action to benefit the environment by planting CRP pollinators. Since most of these Iowans had their land infested through the use of the government-recommended CRP seed mixture, CRP contracts could also be negatively affected. This was highlighted by Iowa farmer Marc Knupp, who wanted to use part of his land to give back to the environment by planting a pollinator habitat on his land.[121]

Mr. Knupp said the CRP process was very easy, and everything was going well until Palmer amaranth began to grow in the fields of other peoples' pollinator habitats as a consequence of the contaminated seed mixture.[122] As a result of his fear for Palmer amaranth taking over his fields, Mr. Knupp bought out his CRP contract before he even saw Palmer amaranth in his fields.[123] Mr. Knupp did this so he could combat the Palmer amaranth issue with much stronger tactics than the government allowed CRP owners.[124] The process of "buying out" his contract combined with revenue loss from crops cost Mr. Knupp between $3,000 and $4,000.[125] Luckily, Mr. Knupp was able buy out his CRP contract—stopping Palmer amaranth from spreading throughout his fields—but many farmers across Iowa have not been and will not be as fortunate due to economic constraints or other restricting factors.

Another consequence of Palmer amaranth spreading throughout Iowa, mostly as a result of CRPs, is individuals' growing mistrust of the government and the entire CRP system. In turn, the environment could also face negative consequences since the CRP lands in this case were meant to benefit the environment by establishing more pollinator habitats.[126]

120. Eller, *supra* note 77 (quoting Anthony Cortilet, a noxious weed coordinator at the Minnesota Department of Agriculture).

121. Kacey Birchmier, *Palmer Plagues CRP Acres*, SUCCESSFUL FARMING (April 6, 2017), https://perma.cc/L6B5-MLYP.

122. Id.

123. *Id*.

124. *See* Id.

125. *Id*.

126. Behnken et al., *supra* note 10.

Additionally, Iowa must use the Palmer amaranth infestation as a lesson. The next time an invasive species begins to creep into the state, Iowa needs to act quickly and decisively just as Minnesota did. By acting immediately, and using potent tactics, Minnesota has been able to not only contain the spread of Palmer amaranth, but also to eradicate it from many parts of the state.[127] In the long run, Minnesota's willingness to act a little "insane"[128] and to immediately list Palmer amaranth as an "[e]radicate"[129] weed on the noxious weed list, "Minnesota is likely to reap large dividends by minimizing the future establishment, spread, and economic impact of the weed."[130] Next time, Iowa also needs to be willing to act a little "insane."[131]

127. Eller, *supra* note 77; Scharpe, *supra* note 55.

128. Eller, *supra* note 77 (quoting Anthony Cortilet, Noxious Weed Coordinator at the Minnesota Department of Agriculture).

129. *See generally* Scharpe, *supra* note 55.

130. Gullickson, *supra* note 7 (quoting Bob Hartzler, Professor of Agronomy and Extension Weed Specialist at Iowa State University).

131. Eller, *supra* note 77 (quoting Anthony Cortilet, a noxious weed coordinator at the Minnesota Department of Agriculture).