

# ARE BIOFUEL CROPS THE NEXT KUDZU?

## INTRODUCTION

One of the most notorious intentional plant introductions in the United States is kudzu, also known as “The vine that ate the south.”<sup>1</sup> Kudzu is a perennial vine that is native to Japan and China.<sup>2</sup> In the late 1800s, it was introduced to the United States to be used as a forage crop.<sup>3</sup> In the 1930s, the federal government launched an aggressive campaign to plant kudzu as a solution for soil erosion.<sup>4</sup> The campaign worked, unfortunately too well. Kudzu grew rapidly and spread to other areas, wreaking havoc by choking out beneficial native vegetation.<sup>5</sup> In fact, kudzu has been known to cover almost anything in its path, including power poles, railroad tracks, and even buildings.<sup>6</sup> Ultimately, kudzu was no longer a solution to soil erosion; instead it became an ecological problem itself, causing extensive economic and ecological harm to the United States.<sup>7</sup> Kudzu is as an example of how the government has aggressively promoted and introduced an invasive plant species for a solution to an ecological problem without the adequate knowledge, regulations, and safeguards to prevent the unforeseen and catastrophic consequences that stem from its introduction.

In 2006, seven scientists wrote an article issuing a warning, citing the possibility that some biofuel crops may become invasive.<sup>8</sup> The article highlights President George W. Bush’s 2006 State of the Union Address, which proposes the use of biofuel crops for alternative energy sources,

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<sup>1</sup> Theo Emery, *In Tennessee, Goats Eat the “Vine That Ate the South,”* N.Y. TIMES, June 5, 2007, available at <http://www.nytime.com/2007/06/05/us/05goats.html>.

<sup>2</sup> Richard J. Blaustein, *Kudzu’s Invasion into Southern United States Life and Culture*, in THE GREAT RESHUFFLING 55, 55 (Jeffrey A. McNeely ed., IUCN, 2001).

<sup>3</sup> Amanda Allen, *Kudzu in Appalachia*, in ASPI TECHNICAL SERIES TP 55 (Al Fritsch ed., 2000), available at <http://www.a-spi.org/tp/tp55.htm> (last visited Dec. 24, 2007).

<sup>4</sup> Blaustein, *supra* note 2, at 57.

<sup>5</sup> *Id.* at 56.

<sup>6</sup> *Id.* at 60.

<sup>7</sup> *See id.* at 57-60.

<sup>8</sup> S. Raghu, R.C. Anderson, C.C. Daehler, A.S. Davis, R.N. Wiedenmann, D. Simberloff & R.N. Mack, *Adding Biofuels to the Invasive Species Fire?*, 313 SCI. 1742, 1742 (2006), available at <http://www.sciencemag.org/cgi/content/full/313/5794/1742>.

which may be in conflict with President William Clinton's Executive Order 13,112.<sup>9</sup> The Executive Order 13,112 forbids actions to introduce or enhance non-native species unless "the benefits of such actions clearly outweigh the potential harm caused by invasive species . . . ."<sup>10</sup> The researchers in the article contend that these two presidential "policies may conflict because traits deemed ideal in a bioenergy crop are also commonly found among invasive species."<sup>11</sup> The researchers proclaim that there should be agronomic and ecological analyses, which are already mandated for biocontrol agents and transgenic plants, performed and applied to biofuel crops before putting biofuel crops into large-scale production.<sup>12</sup>

The critical issue stemming from the conflict between these two presidential directives is that biofuel crops could escape cultivation and invade natural areas, causing economic and environmental harm.<sup>13</sup> This Comment explores the legal ramifications if biofuel crops themselves become invasive species. In section one, there is a discussion of why there is a need for renewable energy in the form of biofuel crops and if the United States has enough land resources to meet President Bush's goal. In section two, there is an explanation of how biofuel-related legislation is increasing the speed of biofuel production without taking into consideration the magnitude of the already existing invasive species problem in the United States. In section three, there is a comparison of how similarly the nation is responding to biofuel crops as an ecological solution, just as it responded to kudzu. In section four, there is a discussion of the current federal and state invasive species laws and regulations as well as identification of the significant gaps that would need to be addressed if biofuel crops escape cultivation and become invasive. In section five, there is a discussion of the different approaches for developing a regulatory framework for biofuel crops. Lastly, in section six there is a discussion of the researchers' recommendations for mandated safeguards and how those recommendations are consistent with the intent of Executive Order 13,112 as well as a discussion of a possible involvement of National Environmental Protection Act ("NEPA") for biofuel crops.

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<sup>9</sup> *Id.*

<sup>10</sup> Exec. Order No. 13,112, 64 Fed. Reg. 6183, 6184 (Feb. 3, 1999).

<sup>11</sup> Raghu et al., *supra* note 8, at 1742.

<sup>12</sup> *Id.*

<sup>13</sup> *Id.*

## I. WHY THERE IS A NEED FOR RENEWABLE ENERGY FROM BIOFUEL CROPS

The United States needs to reduce carbon dioxide emissions and lessen its dependence on foreign oil.<sup>14</sup> Renewable energy is derived from regenerative resources that cannot be depleted and may provide a possible solution to both of these problems.<sup>15</sup> However, the development of sustainable renewable resources must not threaten the environment, as biofuel crops will do if they become invasive and spread to natural areas.

### A. *The Need to Reduce Carbon Dioxide Emissions*

The United Nations Intergovernmental Panel on Climate Change reported that “[w]arming of the climate system is unequivocal” and “there is ‘very high confidence’ that human activities since 1750 have played a significant role by overloading the atmosphere with carbon dioxide hence retaining solar heat that would otherwise radiate away.”<sup>16</sup> In 2006, the global carbon dioxide output was thirty two billion tons.<sup>17</sup> The United States alone contributed twenty-five percent of that.<sup>18</sup> Thus, the notion of using biofuel crops as sources for renewable energy from biomass in the form of ethanol and biodiesel is quickly gaining momentum as an alternative to current fossil fuels because they burn cleaner and release fewer carbon dioxide emissions than pure gasoline.<sup>19</sup>

### B. *Dependence on Foreign Oil*

In 2006, President George W. Bush stated “America is addicted to oil, which is often imported from unstable parts of the world. The best way to break this addiction is through technology.”<sup>20</sup> The President announced his Advanced Energy Initiative, a twenty-two percent increase in clean energy research for the Department of Energy.<sup>21</sup> The primary

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<sup>14</sup> Valerie Yeager, *Biofuel: A Burden on the Food Supply?* 9 TODAY'S DIETITIAN 42, 42 (2007), available at <http://www.todaysdietitian.com/newarchives/tdjune2007pg42.shtml>.

<sup>15</sup> U.S. Dep't of Energy, Glossary of Energy-Related Terms: Renewable Energy, [http://www.eere.energy.gov/consumer/information\\_resources/index.cfm/mytopic=60001#R](http://www.eere.energy.gov/consumer/information_resources/index.cfm/mytopic=60001#R) (last visited Dec. 15, 2007).

<sup>16</sup> Jeffrey Kluger, *What Now? Our Feverish Planet Badly Needs a Cure*, TIME, Apr. 9, 2007, at 49, 52.

<sup>17</sup> *Id.* at 52-53.

<sup>18</sup> *Id.* at 53.

<sup>19</sup> Yeager, *supra* note 14, at 43.

<sup>20</sup> President's Address Before a Joint Session of the Congress on the State of the Union, 42 WEEKLY COMP. PRES. DOC. 145 (Jan. 31, 2006) [hereinafter State of the Union 2006].

<sup>21</sup> State of the Union 2006, *supra* note 20, at 150.

focus of this initiative is to “fund additional research for cutting-edge methods of producing ethanol, not just from corn but from wood chips and stalks or switchgrass.”<sup>22</sup> The President also announced his goal to replace seventy-five percent of the nation’s oil imports from the Middle East by 2025.<sup>23</sup>

The President’s energy goal for the nation is ambitious. Ninety-six percent of the energy in the United States comes from nonrenewable sources, such as petroleum, coal, natural gas, and nuclear energy; only four percent comes from renewable sources such as solar, wind and biomass.<sup>24</sup> Of these renewable sources, biomass provides just over three percent of the nation’s total energy consumption.<sup>25</sup> In addition, the United States currently imports seventy percent of its oil.<sup>26</sup> Because the demand for oil continues to grow and the resources continue to shrink, the supply of oil will eventually run out.<sup>27</sup> Moreover, the skyrocketing natural gas and oil prices, the instability in the Middle East, the Iraq war, and an increase in hurricanes together have created a “ripe atmosphere for biomass-related legislation.”<sup>28</sup>

Biomass is “plant or animal based materials such as crops, crop residues, trees, animal fats, by-products, and wastes” and biofuels are biomass that has been “converted into gaseous fuels via biological or chemical process . . . .”<sup>29</sup> Biofuels can also be classified as ethanol, which is derived from such sources as corn or cellulose; and biodiesel, which comes from oilseed crops.<sup>30</sup> Biofuels have existed since the late nineteenth century, but it was not until the energy crisis during the 1970s that people began to look seriously at biofuels.<sup>31</sup> The public focus dimin-

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<sup>22</sup> *Id.* at 150.

<sup>23</sup> *Id.* at 150.

<sup>24</sup> Yeager, *supra* note 14, at 42.

<sup>25</sup> U.S. Dep’t. of Energy and USDA, *Biomass as Feedstock for Bioenergy and Bioproducts Industry* 1,1 (2005) [hereinafter DOE & USDA, *Biomass as Feedstock*], [http://www1.eere.energy.gov/biomass/pdfs/final\\_billionton\\_vision\\_report2.pdf](http://www1.eere.energy.gov/biomass/pdfs/final_billionton_vision_report2.pdf).

<sup>26</sup> Yeager, *supra* note 14, at 42.

<sup>27</sup> *Id.*

<sup>28</sup> Envtl. and Energy Study Inst., *2005 Year in Review, U.S. Biomass Energy Policy*, RENEWABLE ENERGY ACCESS Jan. 4, 2006 [hereinafter EESI], <http://www.renewableenergyaccess.com/rea/news/story?id=41189>; Jeffrey Brainard, *The Big Deals in Biofuels*, THE CHRONICLE, Apr. 20, 2007, <http://chronicle.com/free/v53/i33/33a01801.htm>.

<sup>29</sup> *Principles for Bioenergy Development*, UNION OF CONCERNED SCIENTISTS, Apr. 23, 2007, at 1-2, [http://www.ucsusa.org/assets/documents/clean\\_energy/UCS-Bioenergy-Principles.pdf](http://www.ucsusa.org/assets/documents/clean_energy/UCS-Bioenergy-Principles.pdf).

<sup>30</sup> *Id.* at 1; see Yeager, *supra* note 14, at 42, 43.

<sup>31</sup> Doug O’Brien, *Biofuels: Policy and Business Organization Issues*, THE NAT’L AGRIC. LAW CTR., Sept. 2006, <http://www.nationalaglawcenter.org/research/>. “In 1892,

ished during the 1980s and 1990s when petroleum prices fell.<sup>32</sup> In the 2000s, the public took notice of biofuels again.<sup>33</sup> Biofuels are now at the forefront and have captured the public's attention largely due to the President's current energy policy initiative.

### C. Proposed Biofuel Crops and Land Availability

President Bush identified the use of "wood chips and stalks, or switch-grass" for producing cellulose ethanol as a renewable energy source in his State of the Union Address.<sup>34</sup> Currently, the conventional method of producing ethanol is from corn and biodiesel is produced from soybeans.<sup>35</sup> The reason for the push for development of cellulose ethanol is that burning corn based-ethanol "results in only slightly less carbon dioxide and other greenhouse gasses than is emitted by the gasoline it replaces."<sup>36</sup> Biomass also provides the only renewable alternative in the form of ethanol and biodiesel for liquid transportation fuel.<sup>37</sup> Since cellulose is an abundant organic chemical that exists in virtually all plant material, such as trees and grasses, there is much promise in converting it to ethanol.<sup>38</sup> Thus, the United States is turning its attention to develop cellulose ethanol to provide a cleaner burning fuel source. However, proposed biofuel crops have been studied little which can potentially expose natural areas to unwarranted invasive species if they escape cultivation.<sup>39</sup>

The United States Department of Agriculture ("USDA") and the United States Department of Energy ("DOE") advisory committee produced a report in 2005 that assessed whether the national land resources have the potential to produce a sustainable supply of biomass that would replace thirty percent or more of the nation's present petroleum consumption with biofuels by 2030.<sup>40</sup> Ultimately, in order to accomplish this goal, approximately one billion tons of biomass feedstock would have to be produced annually.<sup>41</sup> The study found that the two largest potential biomass sources, forestland and agricultural land, could pro-

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the first diesel engine was designed to run on peanut oil, and in 1908, the Ford Model T was designed to run on ethanol." Yeager, *supra* note 14, at 43.

<sup>32</sup> O'Brien, *supra* note 31, at 1.

<sup>33</sup> *Id.*

<sup>34</sup> State of the Union 2006, *supra* note 20, at 150.

<sup>35</sup> Yeager, *supra* note 14, at 42.

<sup>36</sup> Brainard, *supra* note 28.

<sup>37</sup> DOE & USDA, *Biomass as Feedstock*, *supra* note 25, at 1.

<sup>38</sup> Yeager, *supra* note 14, at 44.

<sup>39</sup> See Raghu et al., *supra* note 8, at 1742; Brainard, *supra* note 28.

<sup>40</sup> DOE & USDA, *Biomass as Feedstock*, *supra* note 25, at 1.

<sup>41</sup> *Id.*

duce 1.3 billion dry tons of biomass per year, “enough to produce biofuels to meet the one third of the current demand for transportation fuels.”<sup>42</sup> It appears that in the near future, the United States is gearing up for large-scale planting of biofuel crops which could expose the nation to catastrophic consequences by introducing the wrong plant species.

## II. BIOFUEL-RELATED LEGISLATION PROMOTES BIOFUEL CROP PRODUCTION

The development of the biofuel industry stems largely from certain federal polices. The Farm Security and Rural Development Act of 2002 was the first Farm Bill to have an energy title and to include major incentives for the production and use of biomass.<sup>43</sup> Ethanol and biodiesel receive significant federal support from the 2002 Farm Bill in the form of tax incentives, regulatory programs, and loan and grant programs which fund research and development in bioenergy.<sup>44</sup> In 2007, three grants were awarded by the DOE for biofuel research centers, each totaling \$125 million dollars.<sup>45</sup> These provisions give biomass renewable energy projects a “step-up in the growing renewable energy market.”<sup>46</sup>

### A. Energy Policy Act of 2005

The Energy Policy Act of 2005 has significant provisions to boost biomass use. The most notable biomass provision is the Renewable Fuel Standard (“RFS”), which requires blending renewable fuels in gasoline and will virtually double the current market for biofuels.<sup>47</sup> The RFS required in 2006 that fuel suppliers blend four billion gallons of renewable fuel into gasoline, and subsequently increasing it annually to 7.5 billion gallons by 2012.<sup>48</sup> The RFS is significant “because it essentially guarantees a minimum level of demand for renewable fuels . . . .”<sup>49</sup> This guarantee provides the assurance that participants in the biofuel industry will have a “certain segment of the transportation fuel market.”<sup>50</sup> Further-

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<sup>42</sup> *Id.*

<sup>43</sup> See Farm Security and Rural Investment Act of 2002, Pub. L. 107-171, 116 Stat. 134 (2002); EESI, *supra* note 28.

<sup>44</sup> EESI, *supra* note 28.

<sup>45</sup> Brainard, *supra* note 28 (these “grants will be among the largest single federal research grants to academe.”).

<sup>46</sup> EESI, *supra* note 28.

<sup>47</sup> See 42 U.S.C. § 7545(o) (2000).

<sup>48</sup> 42 U.S.C. § 7545(o)(2)(B) (2000).

<sup>49</sup> O’Brien, *supra* note 31, at 3.

<sup>50</sup> *Id.*

more, because Congress has mandated biofuel usage, “in the long term, this mandate may prove even more significant than tax incentives in promoting the use of these fuels.”<sup>51</sup>

### B. Proposed Biofuel Legislation

Congress is in the position to put biofuels on the fast track in the 2007 Farm Bill. There are two important pieces of proposed legislation in the 110th Congress that will greatly affect the production of biofuels. The first is amendment S. 1242 proposed by Senator Jon Tester, the bill to amend the Federal Crop Insurance Act and Farm Security and Rural Investment Act of 2002.<sup>52</sup> This bill will “establish a biofuel pilot program to offer crop insurance to producers of experimental biofuel crops and a program to make loans and loan guarantees to producers of experimental biofuel crops.”<sup>53</sup>

The proposed amendment is significant because currently the ability to obtain crop insurance is a major obstacle for farmers wanting to plant biofuel crops.<sup>54</sup> Insuring new crops can be a lengthy process which can take anywhere from ten to forty years or longer.<sup>55</sup> New crop introductions are inherently risky and notoriously have a high failure rate.<sup>56</sup> Many growers are also required to have insurance for their operating loans.<sup>57</sup> The proposed amendment would alleviate these obstacles and

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<sup>51</sup> BRENT D. YACOBUCCI, BIOFUELS INCENTIVES: A SUMMARY OF FEDERAL PROGRAMS, CRS REPORT FOR CONGRESS, RL 33572, January 3, 2007, available at <http://www.ncseonline.org/NLE/CRSreports/07Feb/RL33572.pdf>.

<sup>52</sup> S. 1242, 110th Cong. (introduced, Apr. 26, 2007), available at <http://www.govtrack.us/congress/billtext.xpd?bill=s110-1242>; see Federal Crop Insurance Act 7 U.S.C § 1501 (2000); Farm Security and Rural Investment Act of 2002, Pub. L. 107-171, 116 Stat. 134 (2002). Senator Tester, one of only two farmers in the Senate, advocates extending federal crop insurance coverage for biofuel crops. Jo Dee Black, *Bill Could Mean Major Changes for Farmers*, GREAT FALLS TRIBUNE ONLINE, June 26, 2007, <http://www.greatfallstribune.com>. Camelina is currently growing in the Senator's home state of Montana. *Id.* The bill is of special interest to Senator Tester because it specifically mentions extending coverage to camelina, an alternative oil-seed crop used to make biodiesel.

<sup>53</sup> S. 1242.

<sup>54</sup> See Jules Janick, Melvin G. Blase, Duane L. Johnson, Gary D. Jolliff & Robert L. Myers, *Diversifying U.S. Crop Production*, in PROGRESS IN NEW CROPS 98, 101 (J. Janick ed., 1996), available at <http://www.hort.purdue.edu/newcrop/proceedings1996/V3-098.html>.

<sup>55</sup> *Id.* at 103; see also SeedQuest, <http://www.seedquest.com/News/releases/2007/may/19152.htm> (last visited Dec. 17 2007); see also Charles S. Johnson, *Tester Bill Would Insure Biofuel Crops*, BILLINGS GAZETTE, May 4, 2007, <http://billingsgazette.net/articles/2007/05/04/news/state/55-tester.txt>.

<sup>56</sup> Janick et al., *supra* note 54, at 103.

<sup>57</sup> *Id.* at 101; Johnson, *supra* note 55.

greatly expedite the process of biofuel production largely due to the fact that most “[g]rowers ordinarily are not interested in new crops without an assured market and marketers will not handle new crops without an assured supply.”<sup>58</sup> Thus, the RFS has essentially provided the growers with their assured biofuel market because it is already mandated by Congress.<sup>59</sup>

The second notable proposed biofuel legislation is the Biofuel Innovation Program S. 36 for the 2007 Farm Bill Energy Title.<sup>60</sup> This program will help encourage farmers to make the switch to growing biofuel crops. It will enroll up to five million acres of land for “next generation” biofuel crops, such as native perennial grasses to promote a sustainable fuel source.<sup>61</sup> This proposed bill has a provision to exclude an energy crop that the Secretary deems to be “invasive or noxious or have the potential to become invasive or noxious, as determined by . . .” the United States Fish and Wildlife Service, USDA, or the relevant State conservation agency.<sup>62</sup> This bill, promoting native species and excluding any invasive or noxious species, appears to take into consideration the concerns of ecologists. However, as discussed below, defining the word “invasive” is not only difficult but can lead to ambiguity and confusion especially with the advent of the new legislation for the 2007 Farm Bill.

### III. HOW BIOFUEL CROPS MAY ADD TO THE INVASIVE SPECIES PROBLEM

The United States is on the fast track to planting large-scale biofuel crops in order to meet the President’s energy goal. There is a tremendous political and social pressure on the United States to push for the production of biofuels from cellulose plants. However, before there is any large-scale planting of biofuel crops, federal and state legislation should address potential ramifications if any of the biofuel crops escape cultivation and become invasive.

#### A. *Overview of the Invasive Species Problem: Invasive Weeds and Plants*

It is estimated that 25,000 nonnative plant species have been introduced to the United States, mainly for commercial or ornamental pur-

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<sup>58</sup> Janick et al., *supra* note 54, at 103.

<sup>59</sup> See O’Brien, *supra* note 31, at 3.

<sup>60</sup> S. 36, 110th Cong. (introduced May 23, 2007), *available at* <http://www.govtrack.us/congress/billtext.xpd?bill=s110-36>.

<sup>61</sup> S. 36; Yeager, *supra* note 14, at 44.

<sup>62</sup> S. 36.



poses.<sup>63</sup> Approximately 5,000 introduced plant species have escaped and are now established in surrounding natural ecosystems.<sup>64</sup> However, only a limited number of those species spread and cause severe harm.<sup>65</sup> Even though a small percentage of nonnative plants ever become invasive, even one of those species can do significant damage.<sup>66</sup> Invasive plants and weeds can “cause significant changes to the ecosystems, upset the ecological balance, and cause economic harm” to agriculture and natural sectors.<sup>67</sup> Furthermore, they can choke out native plant species, alter wildlife and fish habitat, impact human health, and increase fire threats.<sup>68</sup> Invasive plants and weeds threaten biodiversity and are a major contributing factor in the population declines of almost one half of the nation’s endangered species.<sup>69</sup>

The extent of the nation’s invasive plants and weeds problem is enormous. Invasive plants and weeds spread into 4,600 acres daily.<sup>70</sup> Annually, invasive plants claim three million acres, an area which is roughly twice the size of Delaware.<sup>71</sup> Natural areas are significantly affected by invasive plants and weeds.<sup>72</sup> “The spread of invasive weeds in these nonagricultural areas is said to resemble an explosion in slow motion, and weeds now cover an estimated 133 million acres in the United

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<sup>63</sup> David Pimentel, Lori Lach, Rodolfo Zuniga & Doug Morrison, *Environmental and Economic Costs Associated with Non-Indigenous Species in the United States*, 50 *BIOSCIENCE* 53, 53 (2000) (nonnative plants and weeds introductions can be accidental or intentional), available at <http://people.hws.edu/bshelley/Teaching/PimentelEtal00CostExotics.pdf>. This Comment’s focus is intentional introductions.

<sup>64</sup> *Id.*

<sup>65</sup> *The Science of Invasive Species*, UNION OF CONCERNED SCIENTISTS, Nov. 2001, at 1, 3 [hereinafter *Invasive Species*], available at [http://www.ucsusa.org/invasive\\_species/science-of-invasive-species.html](http://www.ucsusa.org/invasive_species/science-of-invasive-species.html).

<sup>66</sup> See Jennifer Forman, *Methods of Introduction of Non-Native Plants Into New Habitats: A Review*, CONSERVATION PERSPECTIVES, Fall 2001, <http://www.nescb.org/epublications/fall2001/invasives.html>; see also Pimentel et al., *supra* note 63, at 53-55.

<sup>67</sup> Ctr. for Envtl. Excellence by Am. Ass’n. of St. Highway Officials, *Invasive Species/Vegetation Management* [hereinafter AASHTO], <http://environment.transportation.org/tools/print.aspx> (last visited Dec. 17, 2007).

<sup>68</sup> *Id.*

<sup>69</sup> OFFICE OF TECH. ASSESSMENT, U.S. CONG., Pub. No. OTA-F-565, *HARMFUL NON-INDIGENOUS SPECIES IN THE UNITED STATES* 1, 70-73 (1993) [hereinafter *OTA Report*]. “The worst NIS have caused species extinctions and wholesale transformations of ecosystems.” *Id.* at 70; see also *Invasive Species*, *supra* note 65, at 1.

<sup>70</sup> AASHTO, *supra* note 67.

<sup>71</sup> Weed Science Society of America, *Invasive Plants Threaten National Landscapes*, June 21, 2007, <http://www.ncwss.org/info/WSSAInvasives07.pdf>.

<sup>72</sup> U.S. GEN. ACCOUNTING OFFICE, GAO-05-185, *INVASIVE SPECIES COOPERATION AND COORDINATION ARE IMPORTANT FOR EFFECTIVE MANAGEMENT OF INVASIVE WEEDS* 1, 1 (2005) [hereinafter *GAO 2005*] available at <http://www.gao.gov/new.items/d05185.pdf>.

States.”<sup>73</sup> “This is not natural evolution; rather changes ramped up by increased global mobility” and these changes are “caused by human decisions.”<sup>74</sup> Economically, the United States is impacted significantly. The United States spends thirty-six billion dollars annually addressing invasive weeds.<sup>75</sup> Nationwide, invasive species cause an estimated \$137 billion dollars of environmental damage per year.<sup>76</sup>

*B. An Objective of Executive Order 13,112 is to Identify Invasive Species Pathways*

In February 3, 1999 President Clinton signed Executive Order 13,112.<sup>77</sup> The intent of the Executive Order is to protect the United States from harm caused by invasive species. It creates an Invasive Species Council made up of the heads of several departments and agencies including the Secretary of State, the Secretary of Defense, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Transportation, and the Administrator of the Environmental Protection Agency.<sup>78</sup> This council, as directed by the Executive Order, developed a national plan which includes addressing invasive weeds and plants.<sup>79</sup> One of the goals of the management plan is to “include a review of existing and prospective approaches and authorities for preventing the introduction and spread of invasive species, including those for identifying pathways by which invasive species are introduced and for minimizing the risk of introductions via those pathways . . . .”<sup>80</sup> When this order was signed in 1999, it appears cellulose biofuel crops were not considered yet as a source for renewable energy. This assertion is supported by the fact of

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<sup>73</sup> *Id.* at 1. Once these species become established, the seeds of the invasive plants spread through wind, water, and animals. *Id.* at 9. Moreover, the seeds can hitch a ride on people or their vehicles. *Id.* They can also spread as a result of disturbance in ecological systems, such as “deforestation, road building, or changes in water quality or quantity.” *Id.*

<sup>74</sup> AASHTO, *supra* note 67.

<sup>75</sup> Pimentel et al., *supra* note 63, at 58-59 (“The annual cost of introduced weeds to the U.S. agricultural economy is approximately \$26.4 billion.”).

<sup>76</sup> *Id.* at 53. A notable example of economic and ecological harm caused from an invasive weed is cheatgrass. Cheatgrass, native to southern Europe, was introduced to western North America in the late 1800s. *Invasive Species*, *supra* note 65, at 5. A century later, it has become one of the most costly invasive species in the United States and currently has spread to 40 million acres of the western part of North America. *Id.* “Cheatgrass has drastically increased the frequency of fires to a nearly annual cycle.” *Id.*

<sup>77</sup> Exec. Order No. 13,112, 64 Fed. Reg. at 6183.

<sup>78</sup> *Id.* at 6184.

<sup>79</sup> *Id.*

<sup>80</sup> *Id.* at 6185.

the lack of legislation promoting cellulose biofuels at that time. This brings up the concept that agriculture, specifically large-scale planting of biofuel crops, could be an additional pathway for invasive species.

*C. Intentional Introduction of Invasive Species: Agriculture as a Pathway*

The majority of introduced plant species in the United States were introduced intentionally.<sup>81</sup> Some of these plant species which have escaped cultivation and caused significant harm to the United States have stemmed from the ornamental and agricultural sector.<sup>82</sup> However, not all intentional introductions are harmful. For example, many of the major crops growing in the United States today are nonnative and are also non-invasive.<sup>83</sup> These crops, such as cotton, corn, and rice do not escape cultivation, and serve their intended purpose.<sup>84</sup> Livestock and ornamental plants are also examples of intentional introductions of nonnative species that have proven to be very beneficial to the United States.<sup>85</sup> Over 4,000 introduced plant species that were introduced for food crops do not display harmful or invasive characteristics.<sup>86</sup> Nevertheless, a small percentage of these introduced plants for cultivation, such as for food, spices, and medicinal uses have escaped and invaded natural areas.<sup>87</sup> Of the 300 nonindigenous weeds prevalent in the western United States, at least eight of those weeds have been cultivated as crops and twenty-eight have escaped horticulture and invaded other areas.<sup>88</sup> Although the number is low in comparison to how many plant species do not escape cultivation,

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<sup>81</sup> Forman, *supra* note 66.

<sup>82</sup> *See id.*

<sup>83</sup> *See* GAO 2005, *supra* note 72, at 8; *See* OTA Report, *supra* note 69, at 56.

<sup>84</sup> *See* Joe DiTomaso, Jodie Holt & Nelroy Jackson, *Biofuels and Invasive Plant Species*, WSSA, Feb. 2007, [http://www.wssa.net/Weeds/Invasive/BIOFUEL\\_AND\\_INVASIVES\\_white\\_paper.pdf](http://www.wssa.net/Weeds/Invasive/BIOFUEL_AND_INVASIVES_white_paper.pdf).

<sup>85</sup> OTA Report, *supra* note 69, at 56.

<sup>86</sup> GAO 2005, *supra* note 72, at 8.

<sup>87</sup> Sarah Hayden Reichard & Peter White, *Horticulture as a Pathway of Invasive Plant Introductions in the United States*, 51 *BIOSCIENCE* 103, 103 (2001), available at [http://www.bio.unc.edu/Faculty/white/Reprints/Reichard\\_White\\_Horticulture%20as%20a%20Pathway.pdf](http://www.bio.unc.edu/Faculty/white/Reprints/Reichard_White_Horticulture%20as%20a%20Pathway.pdf).

<sup>88</sup> OTA Report, *supra* note 69, at 62. In 1993, the congressional OTA released the first comprehensive examination of invasive species' impacts on economic, environmental, and political sectors. The OTA is a landmark report that "provides the benchmark against which we measure improvements." Nat'l Envtl. Coalition on Invasive Species, Fact Sheet, [http://www.ucsusa.org/assets/documents/invasive\\_species/the\\_problem.pdf](http://www.ucsusa.org/assets/documents/invasive_species/the_problem.pdf) (last visited Dec. 23, 2007). In 2000, the Cornell report estimated 500 introduced plant species had become weed pests in crop systems (including forage crops). Pimentel et al., *supra* note 63, at 58.

the harm caused by just one plant species that has become invasive can be insurmountable.<sup>89</sup> Since grasses and other nonnative plant species are being considered for cultivation as biofuel crops, it is important to identify the potential legal, economic, and environmental ramifications if the cultivation of biofuel crops goes awry. Recognizing that agriculture can be a pathway for invasive species is consistent with the intent of Executive Order 13,112.

#### IV. HISTORICAL INTENTIONAL INTRODUCTIONS OF PLANT SPECIES TO SOLVE ECOLOGICAL PROBLEMS

Before there is large-scale planting of biofuel crops, it is necessary to consider past purposeful introductions of nonnative species to comprehend the gravity of the problem if these crops do escape and invade natural areas. Historically, the United States has accepted claims about the supposed benefits of nonnative plant species to solve ecological problems without solid substantiation.<sup>90</sup> After the catastrophic consequences from the introduction of the wrong plant species in the past, legislatures and the public alike probably would not have rushed to introduce these species.

##### A. History of Kudzu

Kudzu (*Pueraria lobata*) was introduced into the United States in 1876 at a Philadelphia exhibition from Japan.<sup>91</sup> In the 1910s, it was used as a forage crop.<sup>92</sup> Approximately ten years later, the Georgia Railroad took interest in kudzu and distributed free kudzu plants to farmers in order for them to grow it as hay.<sup>93</sup> In 1930, the government became the major player in promoting kudzu.<sup>94</sup> During the Great Depression, massive soil erosion on southern farmlands seriously threatened the region's

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<sup>89</sup> See Pimentel et al., *supra* note 63, at 58-59. An example of an unforeseen cultivation escape is garlic mustard. In the 1800s, garlic mustard (*Alliaria petiolata*), a flowering plant in the mustard family, was introduced to North America as a culinary herb. Nat'l Agric. Library, USDA, *Plants Species Profiles: Garlic Mustard*, <http://www.invasivespeciesinfo.gov/plants/garlicmustard.shtml> (last visited Dec. 16, 2007). This plant became invasive and is now declared a "noxious weed" by the U.S. Natural Res. Conservation Serv., USDA, *Plants National Database: Garlic Mustard*, <http://plants.usda.gov/java/profile?symbol=ALPE4> (last visited Dec. 16, 2007).

<sup>90</sup> See *Invasive Species supra*, note 65, at 3-4; see Forman, *supra* note 66.

<sup>91</sup> Blaustein, *supra* note 2, at 56.

<sup>92</sup> Allen, *supra* note 3.

<sup>93</sup> Blaustein, *supra* note 2, at 57 (hay had been a profitable crop at that time and the railroad was used to transport it).

<sup>94</sup> *Id.*

agricultural sector.<sup>95</sup> The federal government launched a campaign to plant kudzu, through the Soil Erosion Service and later through the Soil Conservation Service, during the 1930s and 1940s as a solution for soil erosion.<sup>96</sup> By 1950, the federal government had distributed eighty four million kudzu seedlings to southern landowners and offered them eight dollars per acre as an incentive to plant kudzu on their land.<sup>97</sup> In 1934, there was an estimated 10,000 acres planted with kudzu and by 1946, acreage increased to almost three million acres.<sup>98</sup> Even though farmers became concerned about kudzu's invasiveness, the federal government did not remove it from the list of permissible cover plants until the 1950s under the Agricultural Conservation program.<sup>99</sup> Nearly twenty years later, the USDA identified kudzu as a "common weed."<sup>100</sup> In 1997, almost a century after its introduction, kudzu was listed as a "noxious weed" under the Federal Noxious Weed Law.<sup>101</sup> By that time, kudzu had invaded seven million acres in natural areas and it continues to spread to over 120,000 acres annually.<sup>102</sup> In the United States, it is estimated that kudzu causes over \$100 million dollars of damage per year, and if factoring in the nation's lost productivity in forests, the costs increases to over \$500 million dollars per year.<sup>103</sup>

Kudzu continues to alter the landscape of the United States' agricultural lands as well as the nation's natural areas.<sup>104</sup> It stifles agriculture production as a result of its rapid growth and its ability to climb over plants and trees, smothering them by heavy shading.<sup>105</sup> It also harms forest areas by inhibiting the process of tree renewal, which in turn prevents new growth of native trees.<sup>106</sup> Kudzu out-competes native plants and ultimately disrupts wildlife habitats by diminishing vital resources and food.<sup>107</sup>

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<sup>95</sup> *Id.*

<sup>96</sup> *Id.*; John W. Everest, James H. Miller, Donald M. Ball & Mike Patterson, *Kudzu in Alabama*, JOURNAL OF EXTENSION, Aug. 1999, <http://www.aces.edu/pubs/docs/A/ANR-0065/>.

<sup>97</sup> Blaustein, *supra* note 2, at 57; Everest, *supra* note 96.

<sup>98</sup> Blaustein, *supra* note 2, at 57; Everest, *supra* note 96.

<sup>99</sup> Blaustein, *supra* note 2, at 57.

<sup>100</sup> *Id.*

<sup>101</sup> *Id.*

<sup>102</sup> Blaustein, *supra* note 2, at 57; Everest, *supra* note 96.

<sup>103</sup> Blaustein, *supra* note 2, at 60.

<sup>104</sup> *See id.* at 57-58.

<sup>105</sup> Allen, *supra* note 3.

<sup>106</sup> Blaustein, *supra* note 2, at 58.

<sup>107</sup> *Id.*

Kudzu also harms the nation's power and transportation sectors.<sup>108</sup> It causes significant problems to the rail system due to the slick pulp that is produced when the vines get on the track, which leads to derailments.<sup>109</sup> Ironically, the railroad was one of its first promoters. In addition, kudzu overtakes power poles by weaving into the hot wire thus producing power outages.<sup>110</sup> Countless manpower is devoted annually to clear the vines from these power poles.<sup>111</sup> Kudzu is a cautionary example of how the government can promote a plant species to solve an ecological problem without establishing adequate safeguards.

### 1. Will History Repeat Itself?

There are several similarities between the federal government's involvement in the distribution of kudzu and its proposed large-scale planting of biofuel crops today. First, in the 1930s and 1940s, the massive soil erosion during the Great Depression is comparable to today's ecological problem of global warming and the decreasing supply of fossil fuels. Second, massive promotional campaign by the government to promote kudzu as a solution to soil erosion is strikingly similar to the increase in biofuel-related legislation to promote biofuel crops as a solution for the decreasing supply of fossil fuels and global warming. Last, the governmental economic incentives given to farmers to encourage them to plant kudzu on their land is analogous to the governmental economic incentives in the form of tax, grants, and loans offered to potential growers of biofuel crops. There are many lessons to be learned from this infamous example. Most critically, the long lag time before legislative response can make an enormous difference ecologically.

#### *B. Kudzu as an Example of the Law of Unintended Consequences*

Kudzu is an example of the law of unintended consequences which can be defined as "actions of people—and especially of government—always have effects that are unanticipated or 'unintended.'"<sup>112</sup> The gov-

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<sup>108</sup> See *id.* at 60.

<sup>109</sup> *Id.*

<sup>110</sup> *Id.*

<sup>111</sup> See *id.*

<sup>112</sup> Rob Norton, *Unintended Consequences*, LIBRARY OF ECONOMICS AND LIBERTY: THE CONCISE ENCYCLOPEDIA OF ECONOMICS, <http://www.econlib.org/library/Enc/UnintendedConsequences.html> (last visited Dec. 17, 2007). The steel industry provides another example of a policy with unintended consequences. The government imposed quotas on steel imports to protect steelworkers and the steel companies from lower-priced foreign competition. *Id.* Unfortunately, these companies made less of the inexpensive steel needed by the automakers. *Id.* When the U.S. automakers had to pay more for the steel

ernment was unaware of the consequences when it offered financial incentives to grow kudzu. When it realized the invasiveness of the vine, it responded slowly by not declaring it a “noxious weed” until a century after its introduction. The government today has chosen to ignore potential unintended consequences of biofuel crops and put them on the fast track for large-scale introduction without any adequate safeguards. By actively promoting large-scale biofuel crop introductions as a solution for the energy crisis, the government may cause the unintended result of contributing to the invasive species problem by introducing invasive species.

*C. Examples of Other Government-Sponsored Intentional Plant Introductions that have Gone Awry*

Not only have the federal, state, and local governments sponsored numerous nonnative plant introductions to provide solutions for ecological problems, but they have also sponsored planting projects such as for parks and trees as well as to provide shelter and wind barriers.<sup>113</sup> These nonnative plant species have been selected for these projects because they possess qualities such as pollution tolerance and hardiness; however, these qualities allow the nonnative species to become invasive and spread by out-competing native species.<sup>114</sup> An example of a nonnative species that has spread beyond its original purpose is the multiflora rose (*Rosa multiflora* Thunb). This is a thorny perennial shrub native to Asia.<sup>115</sup> It was introduced to the United States in 1866 as a rootstock for ornamental roses.<sup>116</sup> In the 1930s, like kudzu, it was promoted by the U.S. Soil Conservation Service for erosion control and as a “living fence” to confine livestock.<sup>117</sup> Soon after, several state conservation departments distributed rooted cuttings to landowners for free to be used as wildlife cover.<sup>118</sup> Since multiflora rose is “tenacious” and has “unstoppable growth” which eventually crowds out native species, it is now classified a “noxious weed” in many states.<sup>119</sup>

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than their foreign competitors did, it was harder for the auto industry to compete with the imports. *Id.*

<sup>113</sup> Forman, *supra* note 66.

<sup>114</sup> *Id.*

<sup>115</sup> Nat'l Agric. Library, USDA, *Plants Species Profiles: Multiflora Rose*, <http://www.invasivespeciesinfo.gov/plants/multiflorarose.shtml> (last visited Aug. 8, 2007).

<sup>116</sup> Plant Conservation Alliance's Alien Plant Working Group: *Multiflora Rose*, <http://www.nps.gov/plants/alien/fact/romul1.htm> (last visited Aug. 8, 2007).

<sup>117</sup> *Id.*

<sup>118</sup> *Id.*

<sup>119</sup> *Id.*

Not only has the government been slow to respond to species introductions that have gone awry, such as kudzu and multiflora rose, but sometimes it has chosen to turn a blind eye. An example of this is how it responded to the *Elaeagnus* species, a native to Asia.<sup>120</sup> The United States Army Corps of Engineers recommended *Elaeagnus* for site restoration as late as the 1990s.<sup>121</sup> This is surprising “because it was already known that the efficient dispersal of fruits by birds and the plants’ continuous resprouting ability had enabled *Elaeagnus* to become one of the most numerous invaders in the United States.”<sup>122</sup> If some biofuel crop species unfortunately do escape cultivation and invade natural areas, hopefully the United States learn from the lessons of the past and respond more quickly.

#### D. Biofuel Crops

Using biofuel crops to produce biofuels may provide a way to slow global warming and lessen our dependence on foreign oil; however, we should proceed with caution in order to prevent the introduction of the wrong species. Introducing a new plant species into a new environment can be risky and calls for a closer look at some of the proposed biofuel crops because of the massive scale of the plant introductions that will be required to meet President Bush’s renewable energy goal.<sup>123</sup> These plant introductions are worrisome because “some of the species proposed are close relatives of species that have already shown themselves to be highly invasive.”<sup>124</sup> Additionally, six of the eight traits that are considered ideal for biofuel energy crops also contribute to invasiveness.<sup>125</sup>

Both nonnative and native grasses have been proposed to produce cellulose ethanol.<sup>126</sup> Nonnative grasses are considered the most inconspicuous of the invasive plants.<sup>127</sup> They spread unnoticed due to the fact that they tend to look alike until they flower.<sup>128</sup> Three of the several pro-

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<sup>120</sup> Forman, *supra* note 66. *Elaeagnus angustifolia* (Russian olive) and *E. umbellata* (autumn olive) are among the most invasive plants in America that have been recommended for erosion control. *Id.*

<sup>121</sup> *Id.*

<sup>122</sup> *Id.*

<sup>123</sup> See Raghu et al., *supra* note 8, at 1742.

<sup>124</sup> *Biofuel Crops May Threaten Native Ecosystems, Scientists Say*, WASH. ST. U. NEWS, Sept. 21, 2006, <http://wsunews.wsu.edu/detail.asp?StoryID=6036>.

<sup>125</sup> Raghu et al., *supra* note 8, at 1742.

<sup>126</sup> *Id.*

<sup>127</sup> See Fed. Highway Admin., U.S. Dep’t of Transportation, *The Silent Invaders*, ROADSIDES, Fall 2005, <http://www.fhwa.dot.gov/environment/greeneroadsides/fall05.htm>.

<sup>128</sup> *Id.*



posed grasses for biofuels are giant reed (*Arundo donax*), switchgrass (*Panicum virgatum*), and a hybrid grass (*Miscanthus x giganteus*).<sup>129</sup> Each of these species presents an important issue that should be considered before large-scale cultivation occurs.

Knowledge of whether a particular species has proven to be invasive in another area can be the best predictor that a species will become invasive.<sup>130</sup> The proposed biofuel crop *Arundo donax*, also known as the giant reed because it can grow up to twenty feet, is a nonnative perennial grass.<sup>131</sup> It has been widely planted for erosion control and for ornamental uses and has shown to be extremely invasive in many regions.<sup>132</sup> The Department of Transportation has even placed *Arundo donax* on their list of grasses to watch because it “threatens riparian areas and alters fire cycles.”<sup>133</sup> Currently, *Arundo donax* is labeled as a “noxious weed” in Texas and is invasive in the southwestern states.<sup>134</sup> Because it is already an established invasive species in certain areas, vast planting of *Arundo donax* calls for caution.

A second proposed biofuel crop is switchgrass (*Panicum virgatum*), a perennial grass native to central and eastern United States.<sup>135</sup> Switchgrass, seemingly the most benign of the proposed biofuel crops, was mentioned by name in President Bush’s 2006 State of the Union Address.<sup>136</sup> It has received a lot of attention due to the fact that when converted to ethanol, it produces fewer emissions than either corn or soybeans.<sup>137</sup> Nevertheless, switchgrass should not be ignored for its invasive potential. The USDA has even described it as “weedy or invasive in some regions or habitats” and noted that it “may displace desirable vegetation if not properly managed.”<sup>138</sup> Traditionally, only nonnative species were thought to be invasive, but switchgrass is native to parts of the

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<sup>129</sup> Raghu et al., *supra* note 8, at 1742.

<sup>130</sup> See *Invasive Species*, *supra* note 65, at 4.

<sup>131</sup> Fed. Highway Admin., *supra* note 127; Natural Res. Conservation Serv., USDA, *Plants Database: Arundo donax*, <http://plants.usda.gov/java/profile?symbol=ARDO4> (last visited July 7, 2007).

<sup>132</sup> Fed. Highway Admin., *supra* note 127.

<sup>133</sup> Raghu et al., *supra* note 8, at 1742; *Id.*

<sup>134</sup> Natural Res. Conservation Serv., *supra* at note 131.

<sup>135</sup> Natural Res. Conservation Serv., USDA, *Plant Fact Sheet: Switchgrass*, [http://plants.usda.gov/factsheet/pdf/fs\\_pavi2.pdf](http://plants.usda.gov/factsheet/pdf/fs_pavi2.pdf) (last visited Dec. 17, 2007).

<sup>136</sup> State of the Union 2006, *supra* note 20, at 150.

<sup>137</sup> Jan Suszkiw, *Biofuel Crops Double as Greenhouse-Gas Reducers*, USDA RESEARCH SERVICE, June 8, 2007, <http://www.ars.usda.gov/is/pr/2007/070608.htm?pf=1>.

<sup>138</sup> Natural Res. Conservation Service, *supra* at note 135.

United States.<sup>139</sup> Similarly, the black locust is an established invasive plant in the United States, and also native to the southern Appalachians.<sup>140</sup>

Executive Order 13,112 defines invasive species as “an *alien species* whose introduction does or is likely to cause economic or environmental harm or harm to human health,” and alien species is “any species...that is *not native* to that ecosystem.”<sup>141</sup> However, the problem is that some nonnative species are not invasive and some native species are invasive.<sup>142</sup> To complicate the issue further, a native species can also become invasive through alterations to the environment.<sup>143</sup> In addition, some nonnative plant species can be beneficial in certain sectors of our society while other sectors consider them harmful.<sup>144</sup> This creates complexity and the confusion in invasive species legislation.<sup>145</sup> Because switchgrass is considered native, the nation may have limited legal protection if this plant species became invasive. This strengthens the scientists’ argument for mandatory agronomic and ecological analyses of biofuel crops before any species is introduced.

Another grass proposed as a potential biofuel crop is *Miscanthus (Miscanthus x giganteus)*. This hybrid grass is a native to Asia and is a cross between the Chinese Silver grass (*M. sinensis*) and Amur Silver grass (*M. sacchariflorus*).<sup>146</sup> These two parent species are considered invasive, with Chinese Silver grass listed on the Department of Transportation’s list of invasive weeds.<sup>147</sup> In weed-risk assessments, a known predictor of invasiveness is the “presence of invasive species in the same genus” which lends support to the notion that this hybrid grass is a risky proposed biofuel crop.<sup>148</sup>

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<sup>139</sup> See Invasive Species Advisory Committee, *Invasive Species Definition Clarification and Guidance White Paper*, WILDLIFE DAMAGE MGMT, INTERNET CTR. FOR OTHER PUB. IN WILDLIFE MGMT, April 27, 2006, <http://www.invasivespeciesinfo.gov/docs/council/isacdef.pdf>.

<sup>140</sup> Fed. Highway Admin., *supra* note 127.

<sup>141</sup> Exec. Order No. 13,112, 64 Fed. Reg. at 6183 (first and second emphasis added).

<sup>142</sup> See Invasive Species Advisory Committee, *supra* note 139.

<sup>143</sup> Reichard et al., *supra* note 87, at 105.

<sup>144</sup> *Id.* at 103.

<sup>145</sup> See *id.* at 107.

<sup>146</sup> Raghu et al., *supra* note, 8 at 1742; The Editors, *Searching for Sustainable Energy*, 16 THE ILLINOIS STEWARD, (2007) available at [http://ilsteward.nres.uiuc.edu/issues/2007/Spring/energy\\_4.htm](http://ilsteward.nres.uiuc.edu/issues/2007/Spring/energy_4.htm).

<sup>147</sup> Fed. Highway Admin., *supra* note 127; Editors, *supra* note 146.

<sup>148</sup> Raghu et al., *supra* note 8, at 1742. “*Miscanthus x giganteus* is an allopolyploid that does not produce viable seed and reproduces vegetatively. However, allopolyploid does not guarantee continued sterility and vegetative propagation is often associated with invasiveness or directly contributes to it.” *Id.*

Oilseed crops such as camelina are also proposed for the production of biodiesel.<sup>149</sup> Camelina (*Camelina sativa* (L.)), a nonnative weedy mustard, has been dubbed the “Cinderella of the biofuel crops” because it has shown encouraging results for biodiesel production.<sup>150</sup> However, it can still be “weedy or invasive.”<sup>151</sup> Unknown effects of a species may be critical; they cannot be ignored.

### 1. Global Climate Change and Biofuel Crops

Another concern for large-scale planting of biofuel crops is how global climate change will affect them. “Climate change could potentially favor invasive nonnative species by either creating more favorable environmental conditions,” such as “increasing fire frequency or by stressing native species to the point of being unable to compete against new invasives.”<sup>152</sup> This is significant because if any of the biofuel crops are invasive, climate change may facilitate their spread to natural areas, especially at higher latitudes.<sup>153</sup> For example, kudzu is currently limited by low winter temperatures.<sup>154</sup> However, because of global warming, kudzu is now spreading to northern regions.<sup>155</sup> Furthermore, it is known that invasive weeds also show a strong response to increased carbon dioxide.<sup>156</sup>

Global climate change can further complicate the classification of an invasive species. Classification of a nonnative and native species becomes more challenging because climate change increases the probability of invasions.<sup>157</sup> Invasive species laws are mainly applicable to nonnative invasive species. The Executive Order 13,112 defines a native species as “a species that, other than the result of an introduction, histori-

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<sup>149</sup> S. 1242, 110th Cong. (introduced, Apr. 26, 2007).

<sup>150</sup> Cookson Beecher, *Camelina Catches Researchers' Interest*, CAPITAL PRESS, <http://www.capitalpress.info/> (last visited June 30, 2007); Natural Res. Conservation Serv., USDA, *Plants Database: Camelina microcarpa*, <http://plants.usda.gov/java/profile?symbol=CAMI2> (last visited July 18, 2007).

<sup>151</sup> Natural Res. Conservation Serv., *supra* note 150 (the research is still relatively new and what is currently known is stated on the USDA Plants Profile).

<sup>152</sup> See *Invasive Species*, *supra* note 65, at 4.

<sup>153</sup> See Lewis H. Ziska, *Climate Change Impacts on Weeds*, CLIMATE AND FARMING.ORG 2, <http://www.climateandfarming.org/pdfs/FactSheets/III.1Weeds.pdf> (last visited Dec. 17, 2007).

<sup>154</sup> *Id.*

<sup>155</sup> Catriona E. Rogers & John P. McCarty, *Climate Change and Ecosystems of the Mid-Atlantic Region*, 14 CLIMATE RESEARCH 235, 240 (2000) available at <http://www.int-res.com/articles/cr/14/c014p235.pdf>.

<sup>156</sup> Ziska, *supra* note 153, at 2.

<sup>157</sup> OTA Report, *supra* note 69, at 302.

cally occurred or currently occurs in that ecosystem.”<sup>158</sup> The OTA report recommended in 1993 that new policies “would need to address whether movements by populations in response to climate change should be treated passively as if they were natural or actively.”<sup>159</sup> The Executive Order attempted to clarify what is a native species, but it is still vague and ambiguous when coupled with global climate change. This raises a critical question: if a native species spreads to a new area because global warming has altered its environment, is that species still considered native? The definition in the Executive Order does not answer that question.

## V. INVASIVE SPECIES LEGISLATION

To address the issue of biofuel energy crops escaping cultivation and spreading to natural areas, an overview of current federal and state invasive species laws is helpful. There must not be any gaps that would hinder the management, control, and eradication of biofuel crops.

### A. *Current Invasive Species Legislation and the Identification of Potential Gaps if Biofuel Crops Become Invasive*

Executive Order 13,112 directs federal agencies not to

[a]uthorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless . . . the agency has determined . . . that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm . . .<sup>160</sup>

Essentially, the Order directs federal agencies to perform a risk-benefit analysis before an introduction occurs. Since biofuel crops are on the fast track due to the increase in biofuel-related legislation, an unfortunate consequence is that a risk-benefit analysis may not even be performed. Furthermore, current and proposed biofuel-related legislation rigorously promotes large-scale planting of biofuel crops over vast areas without adequately addressing the potential invasiveness of a proposed biofuel energy crop in the near future. The perceived benefits may be overshadowed by the actual harm that will occur if the wrong plant species is introduced.

In addition to Executive Order 13,112, several federal laws provide direction to agencies for addressing invasive weeds. The Plant Protection

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<sup>158</sup> Exec. Order No. 13,112, 64 Fed. Reg. at 6183.

<sup>159</sup> OTA Report, *supra* note 69, at 302.

<sup>160</sup> Exec. Order No. 13,112, 64 Fed. Reg. at 6184.

Act (“PPA”), the primary federal law governing invasive weeds, authorizes the USDA to list weeds it determines can cause certain harms.<sup>161</sup> The PPA defines the harm as not only damage to agriculture, but also damage to natural areas and the environment.<sup>162</sup> The Federal Noxious Weed List, a classification system that “describes the status and action level for noxious weeds” was created under the PPA.<sup>163</sup> The PPA is designed to regulate the movement of “noxious weeds” in interstate commerce, prohibit and restrict the importation of “noxious weeds,” and can even order that a plant be destroyed.<sup>164</sup> This authority is delegated by the Secretary of Agriculture to the Animal and Plant Health Inspection Service (“APHIS”).<sup>165</sup>

The PPA appears to provide adequate protection from invasive weeds, but this is not always true when it comes to natural areas. Previous acts, now incorporated into the PPA, including the Plant Quarantine Act, the Federal Pest Act, and the Federal Noxious Weed Act, were all aimed at protecting the nation’s agriculture.<sup>166</sup> This bias favoring agriculture leaves natural areas with inadequate protection.<sup>167</sup> Furthermore, in 1993, the OTA reported that relatively few states had natural area weed laws that were separate from agricultural quarantines.<sup>168</sup> As of today, agricultural pests are still the primary concern.<sup>169</sup> This lack of protection and funding is particularly relevant to the cultivation of biofuel crops because of the possibility that they may become pests themselves.

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<sup>161</sup> Plant Protection Act, 7 U.S.C. §§ 7701-7786 (2000); Econ. Research Serv., USDA, *Federal Laws: PPA*, <http://www.ers.usda.gov/Briefing/InvasiveSpecies/institutions.htm> (last visited July 18, 2007).

<sup>162</sup> 7 U.S.C. § 7702(10) (2000); GAO 2005, *supra* note 72, at 1.

<sup>163</sup> 7 U.S.C. § 7712(f)(1) (2000); GAO 2005, *supra* note 72, at 1; APHIS, USDA, *The Plant Protection Act: Plant Protection and Quarantine*, [http://is.aphis.usda.gov/lpa/pubs/fsheet\\_faq\\_notice/fs\\_phproact.html](http://is.aphis.usda.gov/lpa/pubs/fsheet_faq_notice/fs_phproact.html) (last visited Aug. 11, 2007).

<sup>164</sup> 7 U.S.C. § 7712(a) (2000); GAO 2005 *supra* note 72, at 1; APHIS, *supra* note 163.

<sup>165</sup> GAO 2005, *supra* note 72, at 1; APHIS, *supra* note 163. The mission statement for APHIS is it “will exclude, detect, and eradicate newly introduced weeds that pose the highest risk to United States agriculture or the environment.” APHIS, USDA, *Plant Health: Noxious Weeds Program*, [http://www.aphis.usda.gov/plant\\_health/plant\\_pest\\_info/weeds/index.shtml](http://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/index.shtml) (last visited July 4, 2007).

<sup>166</sup> APHIS, *supra* note 163.

<sup>167</sup> U.S. GEN. ACCOUNTING OFFICE, GAO-03-1089R, *INVASIVE SPECIES: STATE AND OTHER NONFEDERAL PERSPECTIVES ON CHALLENGES TO MANAGING THE PROBLEM 1*, (2003) [hereinafter GAO 2003] *available at* <http://www.gao.gov/new.items/d031089r.pdf>. This assertion is supported by the fact that ninety percent of funding goes to the protection of agriculture. *Id.* at 10.

<sup>168</sup> OTA Report, *supra* note 69, at 221.

<sup>169</sup> See GAO 2003, *supra* note 167, at 9-10.

### 1. Funding as a Barrier for Adequate Management: Federal and State

Annually, the United States spends millions of dollars addressing the harmful effects of invasive species in natural areas—mostly through public agencies.<sup>170</sup> However, the invasive species problems in natural areas are not adequately addressed.<sup>171</sup> The lack of funding has contributed to the spread of already established species, such as kudzu.<sup>172</sup> Officials believe that the lack of adequate and consistent funding hinders effective weed management.<sup>173</sup> This is a significant concern because potentially invasive biofuel crops may be planted over large areas. Sources of funding for the control of invasive weeds on nonagricultural land are not clear. For invasive weed management, federal land management agencies such as the Bureau of Land Management and the Forest Service generally do not have specific congressional appropriations.<sup>174</sup> Instead funds are allocated out of their general operational budgets.<sup>175</sup> Typically, state and counties also rely on general operating funds for invasive weed management.<sup>176</sup> The problem is these land management agencies tend to focus on “broader natural resource management issues, such as protecting water quality and reducing soil erosion” so there are less available funds for weed management projects.<sup>177</sup> Since it is important for effective weed control to occur regularly, consistent funding is crucial to keep the population under control.<sup>178</sup> Unfortunately, funding is not consistent due to the yearly fluctuations in the general operating funds.<sup>179</sup> It is counterproductive to spend money to eradicate a species one year only to have a species return the following year because of lack of funding. Federal and state land management agencies must place invasive weeds among other important natural resource management issues.

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<sup>170</sup> OTA Report, *supra* note 69, at 67.

<sup>171</sup> *Id.*; see GAO 2005, *supra* note 72, at 4-6.

<sup>172</sup> GAO 2003, *supra* note 167, at 8.

<sup>173</sup> GAO 2005, *supra* note 72, at 5.

<sup>174</sup> *Id.* at 4.

<sup>175</sup> *Id.* (taking into consideration all of the federal land management agencies, it is estimated that they have spent \$40 million dollars for weed control on their lands).

<sup>176</sup> *Id.* at 4-5. “States and local governments also frequently use funding from the numerous federal grant and cooperative agreement programs that support natural resources and land management activities of nonfederal entities.” *Id.* at 4. “Federal agencies typically select grant applications that best meet the objectives and eligibility criteria of the grant program.” *Id.* at 4-5. “However, funding is not consistent because of the availability of grants.” *Id.* at 5.

<sup>177</sup> *Id.*

<sup>178</sup> *Id.*

<sup>179</sup> *Id.*

## 2. States' Limited Regulatory Power to Address Invasive Plants and Weeds

In order to address the states' limited regulatory power when it comes to invasive species, a brief overview of the relationship between the federal government and states is warranted. The Commerce Clause of the United States vests power in Congress to regulate international and interstate commerce.<sup>180</sup> As a result of this clause, individual states "lack the power to stop importation and release of a potentially invasive" nonnative species in an adjacent state.<sup>181</sup> This will be a critical issue not only if biofuel crops escape cultivation and invade neighboring states, but also if a neighboring state imports a plant species for biofuel crops that is a prohibited plant species in an adjacent state. States such as Alaska and Hawaii have geographical barriers that protect them from the spread of invasive species, but the other states have limited power to prevent invasions from neighboring states or countries.<sup>182</sup>

In *Maine v. Taylor*, 477 U.S. 131 (1986), the United States Supreme Court outlined the limits on state bans against the importation of nonindigenous species. In *Maine*, the defendant operated a bait business and had live bait delivered to him from another state, in violation of a statute prohibiting the importation of live bait.<sup>183</sup> The Supreme Court upheld the constitutionality of the law even though it discriminated against the out of state bait fish dealers.<sup>184</sup> The Court approved the lower court's ruling that Maine had a "legitimate and substantial purpose in prohibiting the importation of a live baitfish," because of "substantial uncertainties" about the effect of a nonnative organism on the current population of wildfish.<sup>185</sup> In addition, the Court held that there was no less discriminatory means available to protect the State from these unpredictable threats.<sup>186</sup> This is a significant ruling because the Court upheld a ban on nonindigenous species based on risks whose significance involved "substantial certainties."<sup>187</sup> The Court concluded that the Commerce Clause's limitation on the states' regulatory power was not absolute and that the states retained authority under their general regulatory powers regarding

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<sup>180</sup> U.S. Const. art.1, § 8, cl. 3. "To regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes." *Id.*

<sup>181</sup> OTA Report, *supra* note 69, at 202; *see* GAO 2003, *supra* note 167, at 6.

<sup>182</sup> OTA Report, *supra* note 69, at 202.

<sup>183</sup> *Maine v. Taylor*, 477 U.S. 131, 132 (1986).

<sup>184</sup> *Id.* at 143.

<sup>185</sup> *Id.*

<sup>186</sup> *Id.*

<sup>187</sup> *Id.* at 151-152.

matters of legitimate local concern.<sup>188</sup> Although the Court has set these limits for interstate commerce, states remain limited in their ability to minimize the invasion of prohibited plants from other states or countries outside their borders.

### 3. “Noxious Weed” Lists

The federal government and the states manage invasive species through cooperative programs because they provide the federal government a feasible avenue to influence state actions.<sup>189</sup> Invasive weeds do not respect jurisdictional boundaries and efforts to control, eradicate, or manage them requires a high degree of cooperation among the federal government and the States.<sup>190</sup> APHIS can address invasive weeds either through these cooperative programs or by procedures in extraordinary emergencies.<sup>191</sup> Sometimes, federal law will preempt state involvement in managing invasive species.<sup>192</sup> Generally, states have regulatory authority to manage invasive weeds within their boundaries.<sup>193</sup> Both the federal government and the States use “noxious weed” lists to regulate invasive weeds.<sup>194</sup>

“Noxious weed” is defined in the PPA as “any plant or plant product that can directly or indirectly injure or cause damage to crops . . . , livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment.”<sup>195</sup> Noxious weed lists are important because when a plant is placed on the list, it can be regulated and restricted.<sup>196</sup> Almost all states use the term “noxious weed.”<sup>197</sup> However, each defines it differently.<sup>198</sup> This can have a direct impact on weed control agencies that are affected in their control efforts based on the definitions because it can actually restrict their control efforts.<sup>199</sup> For example, many states limit their weed control to only species listed on the “noxious weed” list whereas other

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<sup>188</sup> *Id.*

<sup>189</sup> OTA Report, *supra* note 69, at 203.

<sup>190</sup> *See id.* at 204-207.

<sup>191</sup> *See* 7 U.S.C. § 7715 (2000); GAO 2005, *supra* note 72, at 2; *see* OTA Report, *supra* note 69, at 204-207; APHIS, *supra* note 163.

<sup>192</sup> OTA Report, *supra* note 69, at 203.

<sup>193</sup> *Id.* at 221.

<sup>194</sup> GAO 2005, *supra* note 72, at 6.

<sup>195</sup> 7 U.S.C. § 7702(10) (2000).

<sup>196</sup> GAO 2005, *supra* note 72, at 6; *see* Fed. Highway Admin., *supra* note 127.

<sup>197</sup> GAO 2005, *supra* note 72, at 6.

<sup>198</sup> *Id.* at 6.

<sup>199</sup> GAO 2005, *supra* note 72, at 6; GAO 2003, *supra* note 167, at 5-6.



states do not.<sup>200</sup> Furthermore, some states use different classifications to distinguish certain weeds, which also have a direct effect on the authorizing weed control.<sup>201</sup> Unfortunately, these “noxious weed” lists have no preventive value because unlisted potentially invasive weeds can be legally imported.<sup>202</sup> These issues become relevant to the cultivation of potentially invasive biofuel crops because they will be planted across the country, thus potentially exposing states to invasive species that they are virtually powerless to prevent.

“Noxious weed” lists provide regulatory authority to the States to manage invasive weeds and states can use the classification system within their “noxious weed” list to circumvent any legal obstacles that stand in the way of introducing a potentially invasive plant.<sup>203</sup> For example, St. Johnswort (*Hypericum perforatum* L.), a native to Europe, is a perennial herb that was found in California around the early 1900s.<sup>204</sup> Fifty years later, it was found in Idaho and had spread to over 600,000 acres.<sup>205</sup> Today, St. Johnswort is considered an invasive weed and is listed on many states’ “noxious weed” lists.<sup>206</sup> St. Johnswort is not only poisonous to grazing livestock, but it is also a “vigorous competitor in pastures, rangelands, and natural areas.”<sup>207</sup> However, it also has a beneficial medicinal use for treating mild to moderate depression.<sup>208</sup> St. Johnswort is currently grown as a crop in Washington even though it is classified as a Class C “noxious weed.”<sup>209</sup> In Washington, there are three classes of “noxious weeds” with each level mandating a certain level of control. Class A requires the most control, Class B requires some control, and Class C requires virtually no control.<sup>210</sup> St. Johnswort was “downgraded” to a Class C “noxious weed” for it to be grown commercially as a medicinal herb.<sup>211</sup> Today, it is legally grown in the state of

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<sup>200</sup> GAO 2005, *supra* note 72, at 6.

<sup>201</sup> *Id.*

<sup>202</sup> OTA Report, *supra* note 69, at 202, 207; *see* GAO 2003, *supra* note 167, at 6.

<sup>203</sup> *See* OTA Report, *supra* note 69, at 221.

<sup>204</sup> Natural Resources Conservation Serv., USDA, *Plants Database: St. Johnswort*, <http://plants.usda.gov/java/profile?symbol=HYPE> (last visited Aug. 8, 2007); Wash. St. Noxious Weed Control Bd., *Information about Saint Johnswort*, [http://www.nwcb.wa.gov/weed\\_info/Hypericum\\_perforatum.html](http://www.nwcb.wa.gov/weed_info/Hypericum_perforatum.html) (last visited Aug. 12, 2007).

<sup>205</sup> Forest Service, USDA, *Botany Weeds: St. Johnswort*, <http://www.fs.fed.us/r4/sawtooth/botany/weeds/stjohnswort.htm> (last visited Aug. 12, 2007).

<sup>206</sup> Natural Resources Conservation Serv., *supra* note 204.

<sup>207</sup> Wash. St. Noxious Weed Control Bd., *supra* note 204.

<sup>208</sup> *Id.*

<sup>209</sup> Reichard et al., *supra* note 87, at 106.

<sup>210</sup> *See* Wash. St. Legislature, *Definitions*, <http://apps.leg.wa.gov/RCW/default.aspx?cite=17.10.010> (last visited July 27, 2007).

<sup>211</sup> Reichard et al., *supra* note 87, at 106.

Washington on the largest certified organic herb farm in North America.<sup>212</sup> The cultivation of St. Johnswort for a medicinal benefit can be compared to the proposed cultivation of potentially invasive biofuel crops as an alternate fuel source. If some of the proposed biofuel crops are invasive, will states still allow their cultivation because they are beneficial, like St. Johnswort?

Issues may also arise when interest groups oppose the planting of an existing invasive species that is not on its “noxious weed” list. For example, *Arundo donax* is a proposed biofuel crop that is currently invasive in many states including Florida.<sup>213</sup> A company in Florida has petitioned to grow 15,000 acres of *Arundo donax*, or “e-grass,” as renamed by the company, as early as 2009.<sup>214</sup> Since *Arundo donax* has not been declared a “noxious weed” by the Florida Department of Agriculture, it has been exempted.<sup>215</sup> The Florida Native Plant Society is vehemently opposed to the commercial production of *Arundo Donax* because it is currently invasive in different sections of Florida; it has been reported that it is growing outside of cultivation in twenty-three of the sixty-eight counties of Florida.<sup>216</sup> As an added concern, no one has yet to have planted it on such a large scale.<sup>217</sup> The Florida Department of Agriculture claims that *Arundo donax* is “low to moderate risk” in Florida.<sup>218</sup> Because of the interest in large-scale planting of biofuel crops, a Florida statute was amended to include certain protections against the commercial growing of invasive species.<sup>219</sup> Unfortunately, the Florida Department of Agriculture developed a rule that exempts *Arundo donax* and other potential biofuel crops from the Florida statute unless they are declared “noxious weeds,” even though the Florida Exotic Pest Plant Council has already recommended that it be listed.<sup>220</sup> This is just one example of a state al-

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<sup>212</sup> *Id.*; Nutrilite, Certified Organic Trout Lake Farms Wash., [http://www. Nutrilite.com/en-us/Nature/WhyNutrilite/trout-lake.aspx](http://www.Nutrilite.com/en-us/Nature/WhyNutrilite/trout-lake.aspx) (last visited July 31, 2007).

<sup>213</sup> Fla. Native Plant Society, Policy Statement on Arundo Donax, [http://www.fnps.org/committees/policy/pdfs/policyarundo\\_policy\\_statement1.pdf](http://www.fnps.org/committees/policy/pdfs/policyarundo_policy_statement1.pdf) (last visited Dec. 22, 2007).

<sup>214</sup> Kris Hundley, *Power Plant: Is Arundo Donax the Answer to Our Power Problems?*, ST. PETERSBERG TIMES, Feb. 11, 2007, [http://www.sptimes.com/2007/02/11/news\\_pf/Business/Power\\_plant\\_Is\\_Arun.shtml](http://www.sptimes.com/2007/02/11/news_pf/Business/Power_plant_Is_Arun.shtml).

<sup>215</sup> Fla. Native Plant Society, *supra* note 213.

<sup>216</sup> *Id.*

<sup>217</sup> *See id.*

<sup>218</sup> Hundley, *supra* note 214.

<sup>219</sup> Fla. Native Plant Society, *supra* note 213.

<sup>220</sup> *Id.* “The Florida Department of Agriculture and Consumer Services developed Rule 5B-57.011 allows planting of biofuels not listed on the Florida Noxious weeds lists, effectively relieving them from 581.083 F.S. other than through selected control measures

lowing the commercial production of potentially invasive biofuel crops due to the political and social pressure to develop alternative fuels.

## VI. RECOMMENDATIONS

Large-scale introductions of biofuel crops are imminent. Policymakers must develop a systematic regulatory scheme to minimize or prevent unforeseen consequences that may occur if biofuel crops escape cultivation and become invasive. Policymakers cannot just prohibit all biofuel crop introductions. In light of our need to reduce the carbon dioxide emissions and lessen our nation's dependence on foreign oil, prohibiting all biofuel crop introductions would not be a good strategy. The nation must develop a sustainable renewable energy source to counter these two crucial energy issues. Prohibiting all biofuel crops may prevent the use of a noninvasive biofuel crop that might supply the nation with a renewable energy source. Not all biofuel crops are invasive, but some biofuel crops *could* be invasive.

Nor should policymakers maintain the status quo and allow large-scale introductions of biofuel crops with minimum regulations. Present invasive species laws and regulations are insufficient to prevent the disastrous consequences of invasive biofuel crops. The problem with maintaining the status quo in the event of large-scale introductions is that there are substantial scientific uncertainties. This could place the nation at risk for significant financial and environmental harm. The magnitude of large-scale planting could compound this harm.

Policymakers should limit only those biofuel crop species that may become invasive. This could be accomplished by following and performing a risk-benefit analysis that considers the economic and environmental costs in comparison to the potential benefits of the proposed biofuel crops. The Invasive Species Management Plan outlined this analysis in Executive Order 13,112, which states that "recommended measures shall provide for a science-based process to evaluate risks associated with introduction and spread of invasive species and a coordinated and systematic risk-based process to identify, monitor, and interdict pathways that may be involved in the introduction of invasive species."<sup>221</sup>

Scientific analyses are already mandated for biocontrol agents and for transgenic plants, which are nonindigenous species introduced with the potential to become invasive and cause economic and environmental

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that appear to be specific to *Arundo donax* and posting of a bond (maximum \$5000/acre) which is less than the amount specified in 581.083 F.S." *Id.*

<sup>221</sup> Exec. Order No. 13,112, 64 Fed. Reg. at 6185.

harm.<sup>222</sup> This is the same potential harm that may be caused by introduction of biofuel crops.<sup>223</sup> Yet, biocontrol agents provide a benefit by controlling invading weeds without the use of pesticides and transgenic plants provide a benefit as herbicide-resistant crops. The benefit in both cases is the elimination of pesticides. When a target species is put through mandated analyses, the goal is that only noninvasive species are introduced and the nation sustains the intended benefit without any unintended harm.

Biocontrol is the “planned introduction and release of undomesticated target-specific organisms . . . from the weed’s native range to reduce the vigor, reproductive capacity, or density of the target weed in its adventive range.”<sup>224</sup> Before a biological control agent is released, there is rigorous testing that is done to ensure that it will not harm other organisms in the environment.<sup>225</sup> After this testing, the USDA and the APHIS quarantine unit must grant approval.<sup>226</sup> Next, a scientific advisory group must perform a review and make recommendations.<sup>227</sup> There must be an environmental assessment to comply with the Endangered Species Act and NEPA.<sup>228</sup> Once the organism is released, it is continually monitored.<sup>229</sup>

Transgenic plants possess genetic material that has been transferred from a different organism “so that the plant will exhibit a desired trait.”<sup>230</sup> They also undergo a rigorous procedure before they are released into an ecosystem. There is a strong biotechnology regulatory framework that governs transgenic plants.<sup>231</sup> Basically, three agencies and several different committees establish safeguards to prevent the accidental release of any genetically modified matter.<sup>232</sup> Since 1987, APHIS has authorized

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<sup>222</sup> Raghu et al., *supra* note 8, at 1742.

<sup>223</sup> *See id.*

<sup>224</sup> J. Scoles, J.P. Cuda & W.A. Overholt, *How Scientists Obtain Approval to Release Organisms for Classical Biological Control of Invasive Weeds*, U. OF FLA. INST. OF FOOD AND AGRIC. SCI., May 2005, at 1, <http://edis.ifas.ufl.edu/pdffiles/IN/IN60700.pdf>.

<sup>225</sup> *Id.*

<sup>226</sup> *Id.*

<sup>227</sup> *Id.* at 2.

<sup>228</sup> *Id.*

<sup>229</sup> *Id.* at 3.

<sup>230</sup> Economic Research Service, USDA, *Agricultural Biotechnology: Glossary*, <http://www.ers.usda.gov/Briefing/Biotechnology/glossary.htm> (last visited Dec. 22, 2007).

<sup>231</sup> Biotechnology Regulatory Services, USDA, *Biotechnology, Federal Regulations, and the U.S. Department of Agriculture*, [http://www.aphis.usda.gov/publications/biotechnology/content/printable\\_version/BRS\\_FS\\_FedReg\\_02-06.pdf](http://www.aphis.usda.gov/publications/biotechnology/content/printable_version/BRS_FS_FedReg_02-06.pdf) (last visited Dec. 22, 2007).

<sup>232</sup> *Id.*; U.S. Reg. Agric. Biotechnology Website, USDA, *Frequently Asked Questions*, <http://usbiotechreg.nbio.gov/FAQRecord.asp?qryGUID=1> (last visited Dec. 22, 2007). “The responsibility for regulatory oversight of these products is shared by the three Fed-

over 10,000 field tests of genetically modified organisms.<sup>233</sup> Under the PPA, APHIS *must* determine whether a transgenic plant is likely to become invasive.<sup>234</sup> Furthermore, the EPA and the NEPA also require environmental assessments as an added safeguard.<sup>235</sup> Biocontrol agents and transgenic plants have the potential to be invasive and are purposely introduced into new ecosystems; therefore, it is logical to apply the same type of regulatory safeguards to biofuel crops to protect the nation from the misfortune of introducing the wrong plant species.

#### A. NEPA Analysis Should be Mandated for Biofuel Crops

NEPA applies only to federal agencies and the programs they fund.<sup>236</sup> It requires a federal agency to consider environmental impacts before taking any major or significant action.<sup>237</sup> If a federal agency provides any portion of the financing for a project, then the agency must follow certain guidelines required by NEPA.<sup>238</sup> NEPA requires an environmental impact statement (“EIS”) when there will be significant impact on the environment.<sup>239</sup>

NEPA procedures are required as part of the regulatory framework for both biocontrol agents and transgenic plants.<sup>240</sup> An EIS should also be drafted along with the agronomic and ecological assessments that the researchers recommend.<sup>241</sup> NEPA is a procedural statute and courts are limited in reviewing an EIS.<sup>242</sup> NEPA does not mandate a particular result; it only outlines the process needed to prevent “uninformed” agency actions, not “*unwise* agency action.”<sup>243</sup> However, with the advent of a

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eral Agencies: the U.S. Department of Agriculture’s Animal and Plant Health Inspection Service (APHIS), the U.S. Environmental Protection Agency (EPA), and the Department of Health and Human Service. Food and Drug Administration (FDA).” *Id.*

<sup>233</sup> Andrew Pollack, *Lax Oversight Found in Tests of Gene-Altered Crops*, N.Y. TIMES, Jan. 3, 2006, [http://www.nytimes.com/2006/01/03/science/03crop.html?\\_r=1&oref=slogin&pagewanted=print](http://www.nytimes.com/2006/01/03/science/03crop.html?_r=1&oref=slogin&pagewanted=print).

<sup>234</sup> See U.S. Reg. Agric. Biotechnology Website, *supra* note 232.

<sup>235</sup> Biotechnology Regulatory Services, *supra* note 231.

<sup>236</sup> National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321-4370 (2000).

<sup>237</sup> 42 U.S.C. § 4332(2)(C).

<sup>238</sup> 42 U.S.C. § 4332(2)(C).

<sup>239</sup> 42 U.S.C. § 4332(2)(C).

<sup>240</sup> Scoles et al., *supra* note 224, at 2; Biotechnology Regulatory Services, *supra* note 231.

<sup>241</sup> See generally Raghu et al., *supra* note 8, at 1742.

<sup>242</sup> *Int’l Ctr. for Tech. Assessment v. Johanns*, 473 F. Supp. 2d 9, 28 (D.D.C. 2007) “The Supreme Court has explained that ‘it is now well-settled that NEPA itself does not mandate particular results, but simply prescribes the necessary process.’” (quoting *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989)).

<sup>243</sup> *Id.* (emphasis added).

new court case involving transgenic plants, it appears NEPA has a greater impact than once thought.<sup>244</sup> In *International Center for Technology Assessment v. Johanns*, 473 F. Supp. 2d. 9 (D.D.C. 2007), the court ruled that the USDA must halt field trials until more rigorous environmental reviews are done.<sup>245</sup> The court found that the USDA had failed to comply with environmental laws when it approved a transgenic crop without conducting a full EIS.<sup>246</sup> This ruling could be potentially precedent setting, forcing commercial producers to take into consideration the invasiveness of a species before introducing it into the environment. It appears that NEPA is not as limited as once thought and it is reasonable to require its procedures before planting biofuel crops.

## VII. CONCLUSION

We need alternate fuel sources because of global warming and the shrinking oil supply. Biofuel crops may provide a partial solution to both of these problems. However, we must proceed with caution before planting large-scale biofuel crops. Proposed biofuel crops must not escape cultivation and add to the existing invasive species problem. We *must* learn from our past mistakes. It is crucial to establish the invasive potential of a proposed biofuel species before mass planting occurs. If social and political pressure make the nation less cautious, then it is extremely important that there be adequate funding for natural areas if biofuel crops do escape. There should be consistent classifications of “noxious weeds” for federal and state governments alike. Agronomic and ecological analyses should also be mandated for biofuel crops before they are planted on such a large scale, with NEPA as an added safeguard. If these issues are not addressed, instead of talking about kudzu, “The vine that ate the South,” people will talk about “The biofuel crops that ate the United States.”

KAREN RAY

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<sup>244</sup> See *id.* at 28-30.

<sup>245</sup> *Id.*

<sup>246</sup> *Id.*