2. BRIEF DESCRIPTION OF JOB DUTIES

This position provides research and extension programs to improve weed management in sugarcane, vegetables, and bioenergy crops grown on organic soils of the Everglades Agricultural Area and mineral soils of south Florida.

The research effort (35%) is directed to solving current and potential weed management problems in sugarcane and vegetables such as herbicide resistance management (ragweed parthenium), proper timing of herbicide application, and crop tolerance to herbicide application. Additional efforts include better understanding of weed-crop competition, herbicide-soil interactions, and weed-insect interactions to provide the foundation for planning effective weed management strategies. Research in bioenergy crops actively pursues management of potential escapes in sugarcane and vegetables. Also, weed management options for newly released bioenergy crop varieties are evaluated.

The extension effort (65%) provides educational support to county faculty who seek solutions to weed management problems in sugarcane and vegetables. Additional effort includes programs for management of potential bioenergy crop escapes and weed management options for newly released bioenergy crop varieties. The program utilizes workshops, meetings, and field days to provide information to county faculty as well as raise awareness of growers and other clientele on new and/or improved weed management strategies in sugarcane and vegetables. The program emphasizes environmental stewardship with respect to weed management by stressing the importance of correct weed identification followed by safe and effective use of herbicides. Information on weed management and related topics are also disseminated to county faculty, growers, and other clientele using one-on-one contact, hard-copy, and web-based electronic extension publications.

3. AREAS OF SPECIALIZATION

Weed management, weed biology and ecology, soil-herbicide interactions, weed-insect interactions.

4. ASSIGNMENT SINCE LAST PROMOTION (NOT TO EXCEED TEN YEARS), OR SINCE UF EMPLOYMENT

<table>
<thead>
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<tbody>
<tr>
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5. EDUCATIONAL BACKGROUND

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<tr>
<td>University of Wyoming</td>
<td>Agronomy</td>
<td>Doctor of Philosophy</td>
<td>2008</td>
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<tr>
<td>University of Wyoming</td>
<td>Agronomy</td>
<td>Master of Science</td>
<td>2005</td>
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<tr>
<td>Jomo Kenya University of Agriculture and Technology</td>
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<td>Bachelor of Science</td>
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6. EMPLOYMENT

<table>
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<th>Dates</th>
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<tr>
<td>University of Florida Everglades Research and Education Center</td>
<td>Assistant Professor (Tenure accruing)</td>
<td>2010 – current</td>
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<tr>
<td>University of Wyoming Department of Plant Sciences</td>
<td>Postdoctoral Research Associate (Non-tenure accruing)</td>
<td>2008 – 2010</td>
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<tr>
<td>University of Wyoming Department of Plant Sciences</td>
<td>Graduate Research Assistant (Non-tenure accruing)</td>
<td>2003 – 2008</td>
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7. YEAR TENURE/PERMANENT STATUS WAS AWARDED BY UNIVERSITY OF FLORIDA

N/A.

8. UF TENURE AND PROMOTION CRITERIA
To be entered by department administrator.

9. TEACHING, ADVISING, AND INSTRUCTIONAL ACCOMPLISHMENTS

A. Teaching Philosophy, Goals and Methods
My teaching philosophy is to provide an educational framework where principles and applications of weed science and other agronomic concepts are conveyed to graduate and undergraduate students that I mentor and supervise. I ensure that students apply concepts learned in coursework to develop and manage their research programs in addition to understanding my research program. I encourage students to actively participate in additional research projects other than their thesis/dissertation work to expose them to different areas of research in weed science and agronomy. This helps them to keep up-to-date with current or novel developments in agronomic research. In addition, I focus on concepts that enable students to critically think through problems rather than have them memorize facts in order to ensure that they develop skills that they can utilize to solve weed management problems in both agricultural and natural systems.

My goal is to foster education of students by ensuring that they develop critical thinking skills that they can use to formulate and solve research problems. This ensures that they become competent to develop research hypotheses and objectives independently and subsequently gain confidence in conducting their research projects.
Although I do not have a formal teaching appointment, I provide each student with a list of goals at the beginning of their graduate or internship program that they are required to achieve in order to be successful. My expectations of students are that they actively participate in their research projects and ask questions about concepts that they do not understand. I use a hands-on approach to educate students on laboratory, greenhouse, and field based research. Additionally, I ensure total accessibility to students to facilitate their learning. Finally, I involve students in my extension program to provide them with opportunities to interact with growers and have insights into real-world situations in agricultural production. Interaction with growers in this manner is vital as it provides them with opportunities to communicate research results, which is important as conducting research itself.

B. Instructional Activities

- In summer 2015, I served as co-instructor for ENY 6934-Scouting Methods for Plant Health Professionals (2 credit hours, 8 students). This is a graduate course which focuses on teaching survey and scouting methods for weeds, insects, and disease pathogens in different cropping systems in Florida. I taught field scouting and identification of common weeds associated with sugarcane, leafy vegetables, snap bean, radish, celery, sweet corn, tomatoes, pepper, and watermelon in Florida.
- I have supervised two PhD and two Master’s graduate students. Also, I have served on two PhD and two Master’s student committees (see Section 12.).
- The graduate students and employees I supervised have presented 12 oral and poster presentations at professional society meetings (see table below and Section 16. i.).

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Position</th>
<th>Professional Meeting</th>
<th>Type</th>
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<tbody>
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<td>2015</td>
<td>Fernandez, J. V. et al.</td>
<td>Student</td>
<td>Florida Weed Science Society</td>
<td>Oral</td>
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<tr>
<td>2014</td>
<td>Abe, D. O. et al.</td>
<td>Student</td>
<td>Southern Weed Science Society</td>
<td>Oral</td>
</tr>
<tr>
<td>2014</td>
<td>Abe, D. O. et al.</td>
<td>Student**</td>
<td>Florida Weed Science Society</td>
<td>Oral</td>
</tr>
<tr>
<td>2014</td>
<td>Havranek, N. (in Odero et al.)</td>
<td>Biologist</td>
<td>Weed Science Society of America</td>
<td>Poster</td>
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<td>2013</td>
<td>Fernandez, J. V. et al.</td>
<td>Student</td>
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<td>2013</td>
<td>Fernandez, J. V. et al.</td>
<td>Student</td>
<td>Southern Weed Science Society</td>
<td>Oral</td>
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<tr>
<td>2013</td>
<td>Fernandez, J. V. et al.</td>
<td>Student</td>
<td>Southern Weed Science Society</td>
<td>Poster</td>
</tr>
<tr>
<td>2013</td>
<td>Abe, D. O. et al.</td>
<td>Student</td>
<td>Florida Weed Science Society</td>
<td>Oral</td>
</tr>
<tr>
<td>2012</td>
<td>Fernandez, J. V. and D. C. Odero</td>
<td>Student</td>
<td>Florida Weed Science Society</td>
<td>Oral</td>
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<tr>
<td>2012</td>
<td>Havranek, N. (in Odero et al.)</td>
<td>Biologist</td>
<td>Weed Science Society of America</td>
<td>Poster</td>
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</tbody>
</table>

*Graduate student under my supervision.
**Graduate student in whose committee I served.

- I have hosted and supervised four international undergraduate student interns at the Everglades Research and Education Center over a four month period (see table below).

<table>
<thead>
<tr>
<th>Year</th>
<th>Student and Institution</th>
<th>Role</th>
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</thead>
<tbody>
<tr>
<td>Jan – Apr 2014</td>
<td>Ricardo Hiza, Zamorano Pan-American Agricultural School</td>
<td>Supervisor</td>
</tr>
<tr>
<td>Jan – Apr 2013</td>
<td>Luis Contreras, Zamorano Pan-American Agricultural School</td>
<td>Supervisor</td>
</tr>
<tr>
<td>Jan – Apr 2013</td>
<td>Naffie Rodriguez, Zamorano Pan-American Agricultural School</td>
<td>Supervisor</td>
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</table>
Guest Lectures/Instruction:
- I have guest lectured for AGR/SWS 6932-Agricultural and Environmental Sustainability: Issues and Research (2011 and 2012), a graduate course which focuses on acquainting graduate students with agricultural/environmental sustainability issues and supporting research programs in Florida.

10. TEACHING EVALUATIONS

None.

11. EDUCATIONAL PORTFOLIO (if applicable)

N/A.

12. GRADUATE COMMITTEE ACTIVITIES

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<tr>
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<td>Chair Ph.D.</td>
<td>Calvin Howard</td>
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<tr>
<td>Chair Ph.D.</td>
<td>Jose Fernandez</td>
<td>Agronomy</td>
<td>Expected December 2016</td>
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<tr>
<td>Chair Master's</td>
<td>Alejandro Ramos</td>
<td>Agronomy</td>
<td>Expected December 2015</td>
</tr>
<tr>
<td>Chair Master's</td>
<td>Jose Fernandez</td>
<td>Agronomy</td>
<td>December 2013</td>
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<tr>
<td>Member Ph.D.</td>
<td>Tallyta Silva</td>
<td>Agronomy</td>
<td>Expected December 2018</td>
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<tr>
<td>Member Ph.D.</td>
<td>Dev Paudel</td>
<td>Agronomy</td>
<td>Expected December 2018</td>
</tr>
<tr>
<td>Member Master's</td>
<td>Daniel Abe</td>
<td>Agronomy</td>
<td>December 2014</td>
</tr>
<tr>
<td>Member Master's</td>
<td>Leif Willey</td>
<td>Agronomy</td>
<td>December 2012</td>
</tr>
</tbody>
</table>

13. CONTRIBUTION TO DISCIPLINE/RESEARCH NARRATIVE

Summary of Research Accomplishments | Number or Amount |
------------------------------------|------------------|
Refereed research publications (see section 16. f.) | 24               |
Published abstracts (see section 16. i.) | 50               |
Graduate students – chair/co-chair (see section 12.) | 4                |
Graduate students – committee member (see section 12.) | 4                |

Sugarcane is Florida’s most valuable row crop grown on 416,000 acres with an estimated value of $1 billion. Approximately 78% of the sugarcane acreage is on organic soils in the Everglades Agricultural Area (EAA). Vegetables valued at $200 million are grown on approximately 60,000 acres in rotation with sugarcane in the EAA. Generally, weed management is more difficult on these organic soils because of their high organic matter content and large soil microbial population associated with herbicide binding and degradation. The focus of my research effort is to develop weed management programs that include herbicide resistance management for maximization of sugarcane and vegetable production (CRIS project: FLA-BGL-005143).

The Energy Independence and Security Act of 2007 mandated production of 36 billion gallons of
advanced biofuels by 2022 from bioenergy crop feedstocks. However, traits deemed ideal for bioenergy crops typify traits associated with invasive plants. My research effort involves evaluating management options for potential bioenergy crop escapes in sugarcane and vegetables. Also, weed management options for bioenergy crops are evaluated.

My research program encompasses applied and basic research to meet the outlined goals and generate information for the extension program. This is accomplished using combinations of field, laboratory, and greenhouse experiments which allows for implementation of appropriate integrated management strategies specific to problematic weeds. Research results have been published in high quality peer-reviewed journals and presented at professional meetings. The majority of the publications are in *Weed Science, Weed Technology,* and *Crop Protection* which are premier journals nationally and internationally for basic and applied research in weed science.

Specific research areas:

**Weed management in sugarcane**

The research has focused on persistence of soil-applied herbicides on organic soils, effect of weed competition, and the impact of weed-insect interactions on sugarcane.

**Key findings and impacts**

- Atrazine, the most widely used soil-applied herbicide for broadleaf weed control, degrades rapidly under field conditions on organic soils compared to metribuzin. Our research, published in the refereed journal *Weed Technology,* found that metribuzin is a better alternative for weed control in sugarcane on organic soils exhibiting enhanced atrazine degradation and concomitant loss of residual weed. The research findings provided information to the sugarcane industry which has so far adapted use of metribuzin on >100,000 acres to provide residual weed control on organic soils where atrazine is no longer effective. Metribuzin ($21 per acre) use compared to multiple applications of atrazine (at least $28 per acre) saves growers at least $0.7 million.

- Our research, published in the refereed journal *Weed Technology,* found that degradation of pendimethalin, a soil-applied herbicide for grass control is rapid on organic soils. Pendimethalin does not provide residual weed control on organic soils when applied under dry conditions associated with Florida sugarcane early in the season. Sugarcane growers are now saving $34 per acre by eliminating pendimethalin application on organic soils (approximately 325,000 acres) under dry soil conditions prevalent early in the season.

- Competition from fall panicum, the most troublesome annual grass weed in Florida sugarcane can result in up to 60% yield reduction if not controlled in a timely manner based on our research findings published in the refereed journal *Weed Technology.* Information from this program is being used to illustrate the importance of timely fall panicum control and other weed species in sugarcane. For instance, sugarcane yield losses can total up to 27 tons of cane per acre if fall panicum is not controlled in a timely manner compared to a field that would yield 46 tons per acre with timely weed control. This is a potential loss of $1,202 per acre if fall panicum is not controlled.

- Larvae of *Diaprepes* root weevil, an important sugarcane pest was first observed to cause damage to Florida sugarcane in 2010. Our research, published in the *Journal of Entomological Sciences,* a refereed journal, has shown that broadleaf weeds including spiny amaranth,
common purslane, coffee senna, and sicklepod are food sources and oviposition sites for adult weevils. The root weevil can result in total crop failure (sugarcane crop value is $1 billion) because of limited management options. To prevent the root weevil from becoming a major sugarcane pest, my research has shown that timely applications of mesotrione in combination with atrazine will eliminate adult feeding and oviposition hosts, greatly reducing the risk of crop failure. This is an integrated management approach for both weeds and the root weevil.

Weed management in vegetables
The research has focused on evaluation of herbicides for weed control and determination of the period during which these crops must be kept weed-free to avoid irreversible damage from weed competition.

*Key findings and impacts*

- Low-use rate preemergence herbicides pyroxasulfone and saflufenacil + dimethenamid-P provide better broad-spectrum residual control of problematic weeds in sweet corn on organic soils compared to current commercial standards. S-metolachlor safely provides broadleaf weed control in radish on organic soils. Also, tank-mixing s-metolachlor with fomesafen broadens the spectrum of weed control in green beans. These research findings have been published and submitted in the refereed journals, Weed Technology, Crop Management, and HortScience. Pyroxasulfone and saflufenacil + dimethenamid-P use in sweet corn eliminates the need for postemergence herbicide application and tillage to supplement weed control. This will save growers up to $25 per acre (> $900,000 if all acres were treated) associated with postemergence herbicide application and two tillage operations while reducing organic soil subsidence. These low-use rate herbicides are ideal for the environmentally sensitive EAA.

- Our research, published in the refereed journal Weed Science, found that phosphorus fertilization influences the period during which lettuce must be kept weed free to minimize yield losses. The beginning of this period is delayed and the end hastened at high phosphorus levels. This information has changed the management of 12,000 acres of lettuce by providing a “window” in the crop’s cycle during which weeds must be controlled to prevent yield losses. A reduction of phosphorus fertilization below the recommended rate by growers (to reduce cost) in lettuce results in the need for more intensive weed management practices (increase in weed control cost) to attain acceptable yields.

Weed management in bioenergy crops
Research in bioenergy crops focused on management of potential escapes of giant reed and elephantgrass in sugarcane and vegetables either as plants that escape cultivation or persist in subsequent crop rotations when considering their potential production as biofuel feedstocks. Also, weed management options for newly released energycane varieties were evaluated.

*Key findings and impacts*

- Sugarcane grass herbicides (asulam and trifloxysulfuron) do not provide control of giant reed and elephantgrass based on our research, published in the refereed journal Weed Technology. Glyphosate, clethodim, and sethoxydim provide acceptable control of newly-established giant reed and elephantgrass. Selective control of giant reed and elephantgrass is not an option with currently available herbicides in sugarcane implying that escapes will have huge negative economic impact on the sugarcane industry if introduced as bioenergy crops. Vegetable growers will not need additional resources to control escaped newly-
established bioenergy crops because clethodim and sethoxydim used in vegetables will provide acceptable control.

- Sugarcane herbicides can be safely used on energycane for weed control based on our research published in the refereed journal Weed Technology. Energycane tolerance to sugarcane herbicides provides potential grows with options for selective weed control if planted acres increase in the future in the southeast United States.

Herbicide resistant management in non-crop areas

Ragweed parthenium, a weed species associated with noncrop areas in the EAA has been showing no response to glyphosate, a herbicide used for nonselective weed control. Research was conducted to confirm glyphosate resistance and to evaluate management options for ragweed parthenium in the EAA.

Key findings and impacts

- Ragweed parthenium in the EAA has high level of glyphosate resistance. Aminopyralid, aminocyclopyrachlor + chlorsulfuron, saflufenacil, saflufenacil + dimethenamid-P, glufosinate, and hexazinone provide control of glyphosate resistant ragweed parthenium. These research findings have been published in the refereed journals, Weed Technology and Crop Protection. Ragweed parthenium has been encroaching into sugarcane and vegetable fields in the EAA due to lack of control with glyphosate in noncrop areas. Growers are currently using some of the aforementioned herbicides (saflufenacil, glufosinate) to prevent this weed species from spreading and becoming a major economic problem in sugarcane and vegetables.

14. CREATIVE WORKS OR ACTIVITIES

1. **Website**

   Weeds of the Everglades Agricultural Area (EAA) website (developer) available at [http://erec.ifas.ufl.edu/weeds/](http://erec.ifas.ufl.edu/weeds/) for county faculty, growers, and other clientele as an information resource for weed management in sugarcane, vegetables, and bioenergy crops in south Florida.

2. **Instructional Presentations**

   Thirteen slide presentations on weed management in sugarcane and vegetables available at [http://erec.ifas.ufl.edu/weeds/extensionmain.shtml](http://erec.ifas.ufl.edu/weeds/extensionmain.shtml).

3. **Weed Identification Guide**

   Description and pictures of 55 weed species (broadleaves, grasses, and sedges) associated with cropping systems in the EAA and surrounding region available at [http://erec.ifas.ufl.edu/weeds/weed%20id%20index.html](http://erec.ifas.ufl.edu/weeds/weed%20id%20index.html).

15. PATENTS AND COPYRIGHTS

   None.

16. PUBLICATIONS
Authorship key:
Underline = senior/principal author(s), bold = self, g = graduate student, & = other.

a. Books, Sole Author
None.

b. Books, Co-authored
None.

c. Books, Edited
None.

d. Books, Contributor of Chapter(s)
None.

e. Monographs
None.

f. Refereed Publications (Total: 24)


g. **Non-refereed Publications (Total: 57)**

**Electronic Data Information Source (EDIS) (Total: 23) (peer-reviewed)**

EDIS is a publication management system providing a comprehensive, single-source repository of all current UF-IFAS numbered peer-reviewed extension publications that are available for free distribution on the World Wide Web.


Department Newsletter Articles (Total: 30)


**Trade Journals (Total: 4)**
The *Sugar Journal* is a monthly publication that covers global trends in the production, processing, and refining of cane, beet, and corn into food and energy sources distributed to an international audience in the sugar industry. *Florida Grower* is a monthly magazine that serves as a top information source for specialty crop growers in Florida.


**h. Bibliographies/Catalogs**

None.

**i. Abstracts (Total: 50)**


**j. Reviews**

None.

**k. Miscellaneous**

None.
17. LECTURES, SPEECHES, POSTERS PRESENTED AT PROFESSIONAL CONFERENCES

a. International

*Contributed* (Total: 4)


b. National

*Contributed* (Total: 16)


12. **Odero, D. C** (Contributor), R. H. Cherry (Presenter), and D. Hall. Host plants of the sugarcane root weevil in Florida sugarcane. 42nd American Society of Sugarcane Technologists Annual Joint Meeting. St. Pete Beach, FL. June 2012.


c. **Regional**

*Contributed* (Total: 8)


d. **State**

*Contributed* (Total: 8)


e. Local

None.

18. **CONTRACTS AND GRANTS SINCE THE LAST PROMOTION (NOT TO EXCEED TEN YEARS) OR FROM UF EMPLOYMENT FOR TENURE NOMINEES, whichever is more recent.**

a. **FundedExternally**

1. List of External Funding 2010 to 2015

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<th>Grant Title &amp; Dates</th>
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<th>Candidate Allocation (Amount)</th>
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<td>PI</td>
<td>USDA-SCBGP-FB</td>
<td>USDA-SCBGP-FB/Alternative weed management options for leafy greens to mitigate loss of hand labor for weed control (2016-2017)</td>
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<td>$76,743 (90%)</td>
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<tr>
<td>PI</td>
<td>IR-4 Project</td>
<td>IR-4 Performance Project, Clomazone: the nature of crop safety on cilantro (2015)</td>
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<td>$3,000 (100%)</td>
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<tr>
<td>PI</td>
<td>IR-4 Project</td>
<td>IR-4 Performance Project, Clopyralid: the nature of performance on onion (dry bulb) (first year) (2015)</td>
<td>$3,000</td>
<td>$3,000 (100%)</td>
</tr>
<tr>
<td>Co-PI</td>
<td>USDA-SCBGP-FB</td>
<td>Recycling waste byproducts to reduce fertilizer inputs for specialty crops (2014-2015)</td>
<td>$172,577</td>
<td>$34,000 (20%)</td>
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### 2. Summary of External Funding from 2010 to 2015

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<th>TOTAL</th>
<th>Direct Costs</th>
<th>Indirect Costs</th>
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<tr>
<td>Co-Principal Investigator</td>
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<tr>
<td>Investigator</td>
<td>$0</td>
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<tr>
<td>Senior Personnel</td>
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<td>Sponsor of Junior Faculty</td>
<td>$0</td>
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<td>$0</td>
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<td>Totals</td>
<td>$186,051</td>
<td>$174,453</td>
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#### b. Funded Internally

#### 1. List of Internal UF Funding 2010 to 2015

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<td>FAES Research Equipment Matching</td>
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<tr>
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<tr>
<td>PI</td>
<td>Dean of Research UF-IFAS</td>
<td>FAES Research Equipment Matching</td>
<td>$20,065</td>
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<td>Grants (2011)</td>
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#### 2. Summary of Internal Funding 2010 to 2015
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<td>Senior Personnel</td>
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<td>Sponsor of Junior Faculty</td>
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c. Submitted – Pending Decision

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d. Submitted - But Not Funded

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e. In-kind contributions

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In-kind contributions from the Florida sugarcane and vegetable industry have been a crucial component of my research and extension programs. The use of both industry research staff and land for field experiments have been instrumental to the successful implementation of my programs. The chemical industry has provided pesticides and seeds for implementation of my research and extension programs.

f. Monetary (SHARE) contributions

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**Totals** $386,900
19. UNIVERSITY GOVERNANCE AND SERVICE

a. University
   None.

b. College

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c. Department/Center

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20. CONSULTATIONS OUTSIDE THE UNIVERSITY

None.

21. EDITOR OF SCHOLARLY JOURNALS, SERVICE ON EDITORIAL ADVISORY BOARDS, REVIEWER FOR SCHOLARLY JOURNALS

a. Editor
b. Editorial Advisory Boards
None.

c. Reviewer for Scholarly Journals

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d. Book Manuscripts Reviewed
None.

25. INTERNATIONAL ACTIVITIES

a. International Activity
1. Volunteered papers at international conferences (see Section 17. a.).
2. International visitors: hosted and supervised four international undergraduate student interns from Zamorano Pan-American Agricultural School, Honduras in 2012 to 2014 during their 4 month (January – April) internship at the Everglades Research and Education Center (see section 9. B.).
3. International students: I advise and mentor an international graduate student (Jose V. Fernandez) (see section 12.).

b. International Recognition
None.

26. EXTENSION PROGRAMS (for IFAS only)

The extension program utilizes information generated from the research program to educate growers on profitable and environmentally sustainable weed management systems for
sugarcane and vegetables grown on organic and mineral soils of south Florida. The goal of the program is to ensure that there is positive impact on farm efficiency and productivity, technology adoption, and enhanced grower knowledge. This goal is achieved by working in collaboration with sugarcane growers, a sugarcane focus team (includes state and county extension faculty), and vegetable advisory committees to identify and address key weed management issues facing growers. I work closely with the two sugarcane extension faculty from Palm Beach and Hendry County. I also work closely with vegetable extension faculty in the area. I collaborate with other faculty for delivery of extension programs. Information on weed management and related topics are disseminated to county faculty, growers, and other clientele using one-on-one interactions as well as hard-copy and web-based electronic extension publications. Specific program areas include, 1) weed management systems in sugarcane, 2) weed management systems in vegetables, and 3) management of bioenergy crop escapes.

1. Program Area 1: Weed management systems in sugarcane (40%)
   
   **Situation**
   Sugarcane is an important crop on organic soils of the Everglades Agricultural Area (EAA) and mineral soils of south Florida. Approximately 416,000 acres are planted to sugarcane valued at over $1 billion, making it the highest-value row crop in Florida. Sugarcane production not only provides income to the state, but also provides over 25,000 direct jobs in the region. Approximately 78 and 22% of sugarcane acreage is organic and mineral soils, respectively. Organic soils have high cation exchange capacity and large soil microbial populations, often associated with herbicide binding and degradation. These factors combine to promote rapid weed growth while binding or degrading soil applied herbicides significantly reducing their efficacy.

   Weed management is a major cost associated with sugarcane production in Florida. The subtropical climate of south Florida enables weed species to grow and reproduce year-round, resulting in their proliferation if not managed appropriately. Weeds cause an estimated 15% or more reduction in sugarcane yield with the current management practices. Weeds also negatively affect sugarcane production by increasing cost associated with control, and reduce harvest and mill processing efficiency. Some weed species serve as alternate hosts of sugarcane insect pests (e.g. *Diaprepes* root weevil) and disease pathogens (e.g. sugarcane leaf yellow virus). To reduce negative impacts of weeds on sugarcane, the industry spends at least $25 million on weed management programs annually. Despite the huge amount of funds dedicated to weed management, sugarcane yield losses associated with weed interference remain. Therefore, it is imperative to develop weed management programs for sugarcane that are efficacious and sustainable with a goal of having a positive impact on farm efficiency and productivity.

   The target audience for the program includes the two county extension faculty, three sugarcane corporations (Florida Crystals, United States Sugar Corporation, Sugarcane Growers Cooperative of Florida), and crop consultants. County extension faculty need up-to-date information on improved weed management strategies, new herbicide control options, sprayer calibration techniques, and weed identification techniques. Likewise, growers and other stakeholders require information on current weed management recommendations,
correct sprayer calibration, and identification of weeds associated with sugarcane. These recommendations are based on information generated from the research program which is majorly driven by clientele needs.

**Objectives**

1. Educate county extension faculty, growers, and crop consultants on appropriate herbicides for weed management in sugarcane.

2. Improve county extension faculty and growers knowledge on biology and identification of weeds associated with sugarcane.

3. Increase the knowledge base of growers and commercial applicators concerning proper sprayer calibration for uniform and correct rate of application of herbicides.

**Educational efforts and activities**

1. This program focuses on weed management programs for sugarcane in Palm Beach, Hendry, and Glades County. Efforts and activities include:
   - On-farm visits: An average of 22 visits to grower fields every year to answer questions related to weed identification and control. This effort focuses on helping growers to make herbicide spray decisions based on correct weed identification and appropriate timing of application.
   - Cooperator field trial sites: 25 field research trials were conducted on grower fields on herbicide evaluation and effect of weed interference on sugarcane over a five year period.
   - Field days: Conducted 3 field days on cooperator grower fields, 2 at the Everglades REC, and 1 at the North Florida REC to present findings from research trials and new developments on weed management to growers and other stakeholders.
   - Sprayer calibration workshop (Spray Smart): Conducted 2 workshops on calibration of application equipment, nozzle selection, and drift management for growers in the EAA and surrounding region. This activity trains growers on uniform herbicide application which is important for maximizing weed control benefit and avoiding incorrect application that can result in poor weed control, wasted product, carryover, and crop damage. This is a biannual event organized in collaboration with county extension faculty. I also conducted 2 spraying equipment calibration seminars for noncrop areas at an aquatic, natural areas, and right of way workshops.
   - Sprayer calibration exercise (Spray Rodeo): Conducted 3 hands-on sprayer calibration exercises for 90% of spraying equipment operated by growers and commercial applicators in the area. This exercise covers the important steps required for calibration of large-boom spray rigs. National surveys indicate that >50% pesticide application errors are due to improper equipment calibration. This is a biannual event organized in collaboration with county extension faculty.
   - Weed identification workshop: Conducted 2 weed identification workshops for growers and other clientele. The effort focuses on proper weed identification in order to select correct recommendations for management. Proper weed identification results in the selection of correct herbicide(s) needed to control a particular weed problem.
• Pest alert workshop: Organized and participated in a pest alert sugarcane workshop on emerging pest problems in sugarcane in collaboration with county extension faculty.
• Certified Crop Adviser (CCA) seminar: Participated and provided 2 CCA training seminars on persistence of soil-applied herbicides on organic soils and the effects of residual herbicides and plant-back restrictions on successive crops.
• Running an awareness program to educate growers on the economic and environmental costs of unnecessary tillage operations on organic soils. The economic cost is related to high fuel and operational cost of tillage equipment while the environmental cost is associated with subsidence of organic soils.
• Programs for weed control in non-crop areas: This activity focuses on management of particularly glyphosate resistant ragweed parthenium found along canals, ditch banks, field edges, and roadsides but is now encroaching into sugarcane fields in the EAA and surrounding region.
• Member of the sugarcane and rice focus team which is a focal point for driving research and extension needs for growers in the EAA and surrounding areas.
• The above activities have resulted in 922 participants, 585 CEUs, and 149 CCAs.

2. Publications
• 14 EDIS publications developed for proactive delivery of weed control recommendations and to address other agronomic practices in sugarcane production.
• Research work published in 9 refereed journals.
• 38 departmental newsletters, handouts, and trade journals articles to keep clientele up to date on weed management.

3. Website (Weeds of the EAA, http://erec.ifas.ufl.edu/weeds/)
• The website is for use by county extension faculty, growers, and other clientele to download information on weed identification and management.
• The website has 14 powerpoint presentations on weed identification, management, and sprayer calibration.
• The website has a weed identification guide for 37 broadleaf and 18 grass weeds and sedges associated with sugarcane and other crops in the EAA and surrounding region listed by common and scientific name. The guide is designed to provide a user friendly web-based identification of weeds.

Impacts
• The on-farm visits and one-on-one contacts have resulted in correct weed identification and recommendation of appropriate control measures. A survey conducted indicated that 95% of farm managers now scout fields to determine the type of weeds present in a field in order to help determine the spray program, compared to 75% in 2012. This has, in some instances, lowered their weed management cost by $30 per acre by eliminating unnecessary herbicides or tillage. Reduction of tillage has become an important best management practice my program in collaboration with the county extension faculty has been advocating to help reduce subsidence and sustain agricultural production on organic soils of the EAA.
• The hands-on sprayer calibration exercises (Spray Rodeo) showed that 33% of the sprayers were on average spraying 20% above the target spray volume and 25% were using worn out nozzle tips during the first exercise. In the subsequent two exercises,
90% of the sprayers were spraying the right target volume and all had nozzle tips in good working condition. Also, 92% of participants gained knowledge from the spraying equipment calibration information presented. Proper herbicide application rates by our growers as a result sprayer calibration not only provides them with effective weed control and cost savings, but also minimizes over application of herbicides in the environmentally sensitive EAA.

- The weed identification workshops were attended by growers and scouts from local crop consulting companies. A post-test evaluation indicated an average increase of 65% on knowledge gained on identification of weed species associated with sugarcane and other crops in the region. Proper weed identification has enabled our growers to be able to decide on economical methods of control which is an essential first step in weed management.

- Growers (Florida Crystals Corporation and Sugar Cane Growers Cooperative of Florida members who represent >60% of the sugarcane industry) are adopting reduced tillage operations and relying more on herbicides for weed control to reduce the negative environmental cost associated with subsidence of organic soils and high fuel and operational cost of tillage equipment particularly on shallow organic soils. For example, Florida Crystals Corporation is using reduced tillage on 100% of their fields with shallow organic soils during the cropping cycle and fallow period.

- Results from the research and extension programs have resulted in new strategies for triazine herbicides (atrazine and metribuzin) use in the EAA. Research results showed enhanced degradation of atrazine on organic soils of the EAA compared to metribuzin. Based on these results growers (Florida Crystals and Sugar Cane Growers Cooperative of Florida members) are switching to metribuzin for preemergence weed control instead of atrazine in >100,000 acres (>30% of sugarcane acreage on organic soils) saving our growers at least $0.7 million. These cost savings coupled with efficient weed management are focused to increase in the future as more acres move from atrazine to metribuzin use. Adaptation of this practice will ease environmental concerns associated with atrazine use in the environmentally sensitive EAA.

- Atrazine applied at 128 fluid ounces per acre for early postemergence weed control has been the foundation of weed management in the environmentally sensitive EAA. Field research experiments by my program have demonstrated that mesotrione a low-use rate herbicide applied at 3 fluid ounces per acre in combination with atrazine at 16 fluid ounces per acre is very effective. When used by a grower, this tank-mix reduces atrazine use by 87.5% thereby alleviating environmental concerns related to atrazine use in the environmentally sensitive EAA.

- Participants at the Certified Crop Adviser seminars demonstrated a knowledge gain of up to 25% from the information presented. Certified Crop Advisers from a local crop consulting company who spend majority of time advising growers on agronomic practices have been important links in conveying our research findings (for example triazine herbicide degradation) to growers.

2. Program Area 2: Weed management systems for vegetables (20%)

   Situation
   There are more than 60,000 acres of vegetables grown on organic soils of the EAA. The major vegetables include sweet corn, leafy greens (mainly lettuce), snap beans, celery, and
radish. In the EAA, vegetables are grown in rotation with sugarcane on leased land. Intensive practices including weed management options are needed for profitable production of these high-value crops. Organic soils are associated with factors that combine to promote rapid weed growth while significantly reducing herbicide efficacy. This is aggravated by limitation in herbicides available for weed management in vegetables grown on organic soils. Imazethapyr is the only herbicide registered for postemergence broadleaf weed control in lettuce on organic soils. Sweet corn and snap bean growers rely solely on s-metolachlor for weed control. Weed control in celery is dependent on the use of linuron and prometryn. Radish unlike the other vegetables has no herbicides labeled for preemergence or postemergence broadleaf weed control. Weed control by some of these herbicides is erratic resulting in use of hand hoeing and tillage to complement herbicide weed control programs in vegetables. Over time, there has been an increased cost associated with contract hand labor. Therefore, there is a need for additional weed management options that can provide selective and consistent control of weeds to enhance productivity and profitability of vegetable production on organic soils of the EAA.

Objectives

1. Educate county extension faculty and growers on new selective herbicide options that will provide selective weed control for vegetables on organic soils.

2. Educate county extension faculty and growers on correct identification of common weed species associated with vegetables.

Educational efforts and activities

1. This program focuses on vegetable production on organic soils:
   - On-farm visits: An average of 6 visits to grower fields every year to answer questions related to weed identification and control in lettuce, sweet corn, snap bean, and celery.
   - Field trials: 26 field research trials evaluating herbicide efficacy for weed control in lettuce, sweet corn, dry bulb onions, cilantro, radicchio, radish, and green bean were conducted.
   - Training workshops: Conducted 4 trainings on weed management in vegetables.
   - Field days: Conducted 6 field days to present findings from research trials and new developments on weed management on sweet corn, snap beans, and lettuce to growers and other stakeholders.
   - Sprayer calibration and weed identification workshops: See activity for the sugarcane program above.
   - Member of the Palm Beach County Vegetable Advisory Committee and Lettuce Advisory Committee which are focal points for driving research and extension needs for growers in the region.
   - The above activities have resulted in 481 participants and 232 CEUs.

2. Publications
   - 3 EDIS publications developed for proactive delivery of weed control recommendations.
   - Research work published in 5 refereed journals.
   - 12 departmental newsletters, handouts, and trade journals articles developed to keep
clientele up to date on weed management and other production practices.

3. Website (Weeds of the EAA, http://erec.ifas.ufl.edu/weeds/)

- 8 powerpoint presentations on weed identification, management, and sprayer calibration related to vegetable production that is accessed by county extension faculty and growers.
- The website has a weed identification guide with 23 broadleaf and 8 grass weeds and sedges associated with vegetables in the EAA.

**Impacts**

- Research results demonstrate that pyroxasulfone and saflufenacil + dimethenamid-P use in sweet corn eliminates the need for tillage to supplement weed control. This will save growers up to $25 per acre (> $900,000 if all acres are treated) associated with postemergence herbicide application and two tillage operations while reducing organic soil subsidence. These low-use rate herbicides are ideal for the environmentally sensitive EAA. S-metolachlor and fomesafen are now labelled for use in radish and green beans, respectively based on research results conducted by the program. Also, radicchio will be added to the imazethapyr label under Special Local Needs 24 (c) registration through the Third Party Registration (TPR), Inc., a subsidiary of the Florida Fruit and Vegetables Association. These herbicides provide radish, green beans, and radicchio growers with herbicides to minimize negative effect of weeds on their crops.
- On-farm visits to grower fields have resulted in correct weed identification and recommendation of appropriate control measures. Appropriate control measures have resulted in lessening unnecessary herbicide applications in the environmentally sensitive EAA. A survey conducted on lettuce growers showed that 100% of the growers scout fields before making weed management decisions.

3. Program Area 3: Management of potential bioenergy crop escapes (5%)

**Situation**

Perennial grasses that produce lignocellulosic biomass are generating much interest as possible feedstocks for biofuel production. The passage of the Energy Independence and Security Act of 2007 promoted advanced biofuel production (i.e. renewable fuel other than ethanol derived from corn starch) to provide a mandated 36 billion gallons of cellulosic ethanol by 2022. Advanced biofuel production would move the United States toward greater energy independence and security, and increase production of clean renewable fuels from non-traditional crops. The southeast United States including Florida is projected to provide 50% of advanced biofuel from feedstocks including perennial grasses (elephantgrass, giant reed), energycane, and sweet sorghum. However, traits deemed ideal for bioenergy crops such as high productivity, wide adaptability, and low input requirements typify many of the traits commonly associated with invasive plants. Thus, proposed cultivation of large acres of bioenergy crops as biofuel feedstocks in south Florida is raising concern among sugarcane and vegetable growers in the region. To curtail future invasion of bioenergy crop escapes in sugarcane and vegetables if introduced in south Florida, there is need to develop management strategies for these crops.
Objectives
1. Educate county extension faculty and growers on management options for potential bioenergy crop escapes in sugarcane, vegetables, and non-crop areas.
2. Educate county extension faculty and growers on weed management options for newly released bioenergy crop varieties.

Educational efforts and activities
1. This program focuses on management options for potential bioenergy crop escapes:
   - Established 3 research trials to evaluate herbicide efficacy on elephantgrass, giant reed, and energycane.
   - Conducted 1 extension seminar on management of potential escapes of elephantgrass and giant reed attended by 33 growers and other clientele.
2. Publications
   - 3 EDIS articles published for proactive delivery of weed control recommendations and other production practices.
   - Research work published in 3 refereed journals.

Impacts
- Growers are aware that selective control of giant reed and elephantgrass is not an option with currently available herbicides in sugarcane if these perennial grasses are cultivated in the future. Heavy infestation of sugarcane by perennial grass escapes can result in total crop failure, resulting in losses of up to $2,003 per acre for a plant cane crop yielding 45 tons of cane per acre. This implies that escapes will have huge negative economic impact on the sugarcane industry (valued at $1 billion) if these grasses are introduced as bioenergy crops.
- Vegetable growers are aware that they will not need additional resources to control escaped newly-established elephantgrass because graminicides (clethodim, sethoxydim) used in vegetables will provide acceptable control. The cost of $5 to $23 per acre (depending on the vegetable and herbicide) for grass control will not increase when managing newly-established escapes of elephantgrass in 100% of the vegetable acreage.
- Potential growers of energycane have options for selective weed control with currently available herbicides used in sugarcane if planted acres increase in the future in the southeast United States. This implies that effective weed management would be possible in 100% of energycane acreage if planted acres increase in the future.

24. CLINICAL SERVICE, CLINICAL ACTIVITIES, OR CLINICAL PORTFOLIO
N/A.

25. SERVICE TO SCHOOLS
2011 – 2014 Judge at the Palm Beach Regional Science and Engineering Fair.
26. MEMBERSHIP AND ACTIVITIES IN THE PROFESSION

A. MEMBERSHIPS
   a. International
      • International Society of Sugar Cane Technologists, 2015 – present.
   b. National
      • Weed Science Society of America, 2010 – present.
      • American Society of Sugar Cane Technologists, 2011 – present.
      • American Society of Agronomy, 2012 – present.
   c. Regional
      • Southern Weed Science Society, 2011 – present.
   d. State
      • Florida Weed Science Society, 2011 – present.
   e. Local
      None.

B. ACTIVITIES IN THE PROFESSION
   a. International
      None.
   b. National

<table>
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<tr>
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<tr>
<td>Panelist</td>
<td>USDA-NIFA Agriculture Research Initiative Foundational Program, Grant Review Panel</td>
<td>2014</td>
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<tr>
<td>Managing Editor</td>
<td>Journal of American Society of Sugar Cane Technologists</td>
<td>2013 – present</td>
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<tr>
<td>Section Chair</td>
<td>Horticultural Crops Section, 55th Weed Science Society of America Annual Meeting</td>
<td>2015</td>
</tr>
<tr>
<td>Chair</td>
<td>Weed Science Society of America, Membership and Affiliation Committee</td>
<td>2014 – present</td>
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<td>Member</td>
<td>Weed Science Society of America, Herbicides for Minor Uses Committee</td>
<td>2014 – present</td>
</tr>
<tr>
<td>Member</td>
<td>Weed Science Society of America, Placement Committee</td>
<td>2014</td>
</tr>
<tr>
<td>Reviewer</td>
<td>Weed Science Society of America journals, i.e. Weed Science and Weed Technology Journals</td>
<td>2010 – present</td>
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<tr>
<td>Reviewer</td>
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</tr>
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</table>
c. Regional

d. State

e. Local
None.

27. HONORS

a. International
None.

b. National
2012 Best Paper Award (Odero et al. 2012) at the American Society of Sugarcane Technologists Annual Meeting. St. Pete Beach, FL.

c. Regional
None.

d. State

e. Local
None.

f. Other (graduate student awards)
2014 Jose V. Fernandez. 1st Place Master’s Student Oral Presentation, Southern Weed Science Society Meeting, Birmingham, AL.

2013 Jose V. Fernandez. 1st Place Graduate Student Oral Presentation, Florida Weed Science Society Meeting, Haines City, FL.

2012 Jose V. Fernandez. 3rd Place Graduate Student Oral Presentation, Florida Weed Science Society Meeting, Haines City, FL.

28. CHAIR’S LETTER
To be entered by department administrator. Candidate may respond using OPT system.

29. DEAN’S LETTER
To be entered by college administrator. Candidate may respond using OPT system.

30. SAMPLE LETTER TO EVALUATORS
To be entered by department administrator. Note: The sample letter should be a copy of a template, not a copy of an actual letter of solicitation to an evaluator.
31. BIO-SKETCHES OF INDIVIDUALS WRITING SOLICITED LETTERS OF EVALUATION and LETTERS OF EVALUATION
To be entered by department administrator. Note: For ease of review, please upload each biograph and accompanying letter in a separate PDF and note the institution in the “Comments” section.

32. COPIES OF THE LAST FIVE ANNUAL LETTERS OF EVALUATION
To be entered by department administrator. (Do not include these in any materials sent to external evaluators.) Candidate should verify in the OPT system that the correct letters have been entered.

33. FURTHER INFORMATION

Letters for Accepted Refereed Publications:
2. **Odero, D. C., M. Duchrow, and N. Havranek.** Critical timing of fall panicum removal in sugarcane. Weed Technology (Accepted).

-----Original Message-----
From: em.wt.0.4526c1.fe7907af@editorialmanager.com [mailto:em.wt.0.4526c1.fe7907af@editorialmanager.com] On Behalf Of Weed Technology
Sent: Friday, August 14, 2015 1:15 PM
To: Sellers, Brent <sellersb@ufl.edu>
Subject: Weed Technology Submission WT-D-15-00052R1

CC: icburke@wsu.edu

Ref.: Ms. No. WT-D-15-00052R1
Weed Control in Florida Pastures Using Aminocyclopyrachlor Weed Technology

Dear Dr. Sellers,

I am pleased to tell you that your work has now been accepted for publication in Weed Technology.

It was accepted on August 14, 2015.

The paper will be available online (ahead of print) at http://www.wssajournals.org/toc/wete/0/0 after copy editing and typesetting.

Thank you for submitting your work to this journal.

With kind regards,

Jason K. Norsworthy
Editor
Weed Technology

https://mail.ufl.edu/owa/

8/21/2015
Refereed Publications:
