



# Checking in with CenUSA

## ***Sustainable Production and Distribution of Bioenergy for the Central US***

CenUSA Bioenergy is a multidisciplinary project funded by the U.S. Department of Agriculture-National Institute of Food and Agriculture (USDA-NIFA). The goal of the project is to research the production and use of perennial grasses on marginal lands for use as alternative biofuels and bioproducts. Learn more about CenUSA at [www.cenusa.iastate.edu](http://www.cenusa.iastate.edu).

In June 2019, **Patrick Murphy**<sup>1</sup>, an agricultural researcher and president of Digital Agronomy LLC, spoke with CenUSA Communications Intern Tyler Worsham about his experience as a CenUSA co-project director in the area of education.<sup>2</sup> Murphy, one of the original co-project directors, spent much of his time running a multi-institutional bioenergy curriculum program.

### **How did you get involved with the CenUSA project?**

"I was one of the original Co-Pds (Principal Investigators) on the project. He had run an undergraduate research experience (REU) program previously, and I was interested in curriculum development in the bioenergy area. That's sort of how things got started. Of course, we put the program together, and it evolved as CenUSA was carried out."

### **What made you an ideal candidate for that particular objective? Why did they choose you in particular?**



"To be frank, I was familiar with the leadership group here on campus, and I guess that one of the things that was beneficial for me to carry out the CenUSA mission was the fact I have an interdisciplinary background. I'm an engineer as well as an agronomist. It was helpful that I had that background."

### **How did the project challenge and broaden your professional knowledge and skill set?**

"When CenUSA started in 2011, there were clear parallels to what I was already doing as a faculty member at Purdue. I tried the best I could to utilize those synergies, both in my teaching program and the CenUSA activities. Things changed pretty drastically when I left in 2013 in terms of

I primarily ran a bioenergy curriculum program. That was a team from Iowa State University, Purdue University, University of Nebraska, Ohio State University and various others from the project who contributed material. *Pat Murphy*

<sup>1</sup> Learn more about Pat Murphy at <https://www.linkedin.com/in/patrick-murphy-3a8a79a6/>

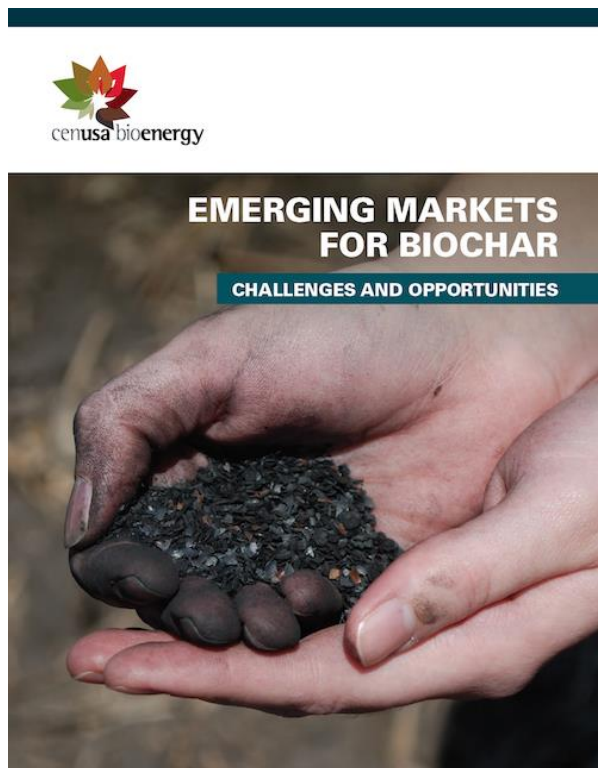
<sup>2</sup> All of the words and ideas expressed in this interview fairly and accurately represent the speaker. Some quotes may be paraphrased for brevity and clarity. The opinions expressed in herein do not necessarily reflect those of Iowa State University, USDA-NIFA, Purdue University, Ohio State University, USDA-ARS, the University of Minnesota, the University of Nebraska, Lincoln, the University of Vermont, or the University of Wisconsin.

how I intended our education program with CenUSA to function operationally. Although I was on campus, I wasn't in the same type of role. We had to involve some other people and push some financials elsewhere to make sure that the objectives were fulfilled in the end."

**To what new ideas and disciplines were you exposed as a part of your involvement?**

"I guess there are two areas. Although I have a crop science background, I have no plant breeding background whatsoever, and the plant breeding area was one of the cornerstones of the project. I think the co-project directors in that area did a fine job of not only doing all of the work they did, but also educating larger groups on the importance and impact of what they were doing.

The other aspect was the things on which Jason Hill (CenUSA co-project director) was working.



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Within the project, the idea that the use of readily available data to estimate health and safety impacts of changes in the production system was and still is a little bit controversial."

**Have you worked in any other projects, and if so, how did they differ?**

"CenUSA is the largest project I have worked on by far. I suspect that it's the largest project that any of the co-project directors have worked on because it's such an extremely large project in terms of its team and the financial backing. Most of my other projects were funded exclusively by industry, and they all operate on such a long timeline.

That was probably the big difference. Industry is typically a year-at-a-time, and projects are doled out per year. They don't provide funding to execute a vision over a long period of time, so you have to take a different approach. The nice thing about CenUSA was the size and length of some long-term operations. Some of these areas take a long time to make real headway on long-term investments. Those areas really moved forward."

**What was your involvement in the education efforts?**

"I primarily ran a bioenergy curriculum program. That was a team from Iowa State University, Purdue University, University of Nebraska, Ohio State University and various others from the project who contributed material. There were some individuals who had industry and government backgrounds who were involved as well.

The purpose was to provide an online curriculum that was broken up in pieces so that educators, both within and external to the project, could utilize those in either an existing

education environment such as a classroom setting or arrange them together and build a course around them that is delivered online. In the third and fourth year of the project, we utilized material from the education and Extension and Outreach objectives to deliver a massive open online course (MOOC) that covered all of the areas of the project.”

**Did you and your team encounter any obstacles, whether they were things you expected or things that you didn't going into it?**

“One of the other pieces of the education program which Raj Raman had previously run was a graduate summer training program, and I really enjoyed it as a doctorate student. Our intent was to do something like that on a smaller scale for CenUSA. Unfortunately, the bulk of the grad students on the project were doing things that were field related. Pulling the students away from the project for two weeks in the middle of the summer was difficult. It was executed, but as far as student involvement in it, we had to rethink that in the second iteration, so changes were made that we thought were more conducive to the limitations of the students and to their interests. The second iteration was very different from the first, but as far as achieving the objectives and bringing grad students together, I think that happened.”



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**What were some of the noteworthy successes that you achieved with CenUSA?**

“Well, I think that throughout the project, at least with the education objective, we certainly had to pivot a number of times. Our education design team switched from one institution to another, and that created some changes there. Some pieces that we had planned to change didn't quite come out as expected. In the end, as far as meeting the objectives that we initially laid out is concerned, we met those expectations and even exceeded them in some places.”

**How receptive were students to the education programs?**

“I think they were very receptive, with the REU program in particular. I believe that the part of the

project that is the most enduring is the generation of human capital. We essentially train the next generation of students in that area. In particular, we had a number of REU students who were studying from programs and institutions that weren't necessarily represented in the project. I know that a number of our students chose to pursue graduate study with members of the program, and many also moved forward with the work they were doing as REU students in their graduate programs.”

**So how did researchers determine which tools and programs were the most effective at teaching the students and audiences you were trying to reach?**

“As far as instruction goes, my assessment is that those students in the programs are the ones who, although not the most in terms of numbers, were the greatest in terms of impact. It’s not necessarily something that we presented to them as a part of the education program, but the experience they had with the co-project directors on the project, as well as with their immediate mentors, was the most impactful education aspect of the program.”

**What was the most noteworthy or the most interesting facet of your work with CenUSA that you would like the generally interested members of the public to understand. What is the most important takeaway?**

“In a sense, if I look at the way that the greater project of CenUSA and the funding authorization with which it was created, it was a very different approach for NIFA. Typically, five-year projects were not done before this. Two-to-three year projects were more typical. Those projects may have rolled over into five years, but for NIFA to make the commitment of a five-year project, along with the financial aspects of that was significant.

That led to the project institutions building teams of not only researchers, but also educators and Extension and Outreach people. USDA’s mission was not only developing ideas and technology, but making it a requirement to bring education, outreach and research or discovery together in a cohesive way that works. As far as administering these things, it becomes a challenge, but as far as impact, this is very much a positive and impactful way to build research programs within NIFA.”

**How will you take your experience with CenUSA and put it to use in future research projects?**

“I guess that from my own past and current research activities after CenUSA, I would say that exposure to the greater project and the work that was being done was very positive, not just in the technical aspects, but in the approaches and various disciplines that are used. I think that’s the piece that I’ve been able to utilize in my work the most. Another aspect of it is that it’s the first time that I’ve worked with and managed such an extensive team of this nature. I had more than students, but peers who are a part of that larger team as well. That’s something that has been useful and helpful to me.”

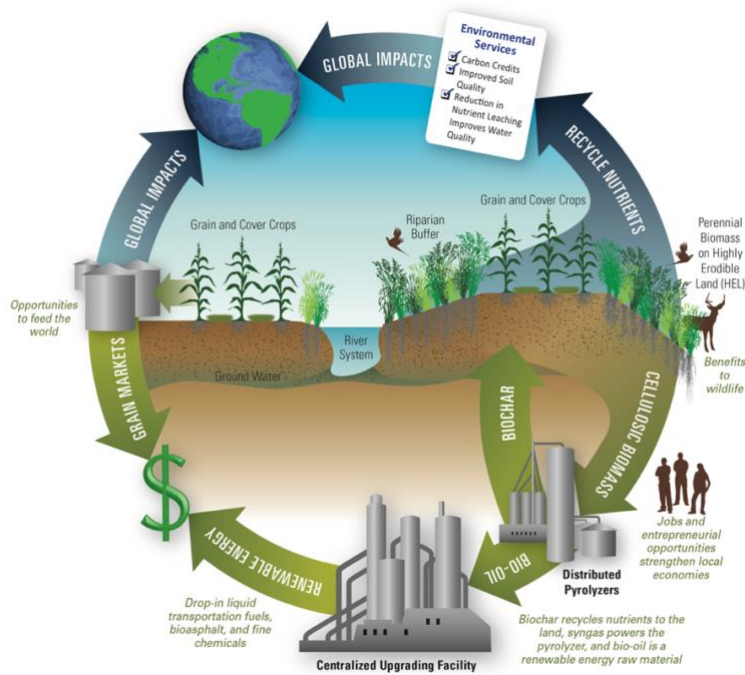
**So in what new directions do you hope to take your own work after CenUSA?**

“My own research wasn’t necessarily represented in the project. At the time, I guess I was primarily doing post-harvest storage work, and I’m still somewhat active in that area. At present, I’m doing more applied crop production work, but all of that is company or industry-funded work. I hope that there’s sustained opportunities in that area. I would like to continue working in this field.”

## **Pat Murphy CenUSA Bioenergy Work Product**

- ✓ Multi-institutional bioenergy curriculum program.
- ✓ Moore, K.J., S. Birrell, R.C. Brown, M.D. Casler, J.E. Euken, H.M. Hanna, D.J. Hayes, J.D. Hill, K.L. Jacobs, C.L. Kling, D. Laird, R.B. Mitchell, P.T. Murphy, D.R. Raman, C.V. Schwab, K.J. Shinnors, K.P.

Vogel, J.J. Volenec. 2014. Midwest Vision for Sustainable Fuel Production. *Biofuels* 5(6): 687-702.  
doi: 10.1080/17597269.2015.1015312



## CenUSA Bioenergy Vision

Learn more about CenUSA at [www.cenusa.iastate.edu](http://www.cenusa.iastate.edu)

CenUSA Bioenergy is supported by Agriculture and Food Research Initiative Competitive Grant No. 2011-68005-30411 from the USDA National Institute of Food and Agriculture