

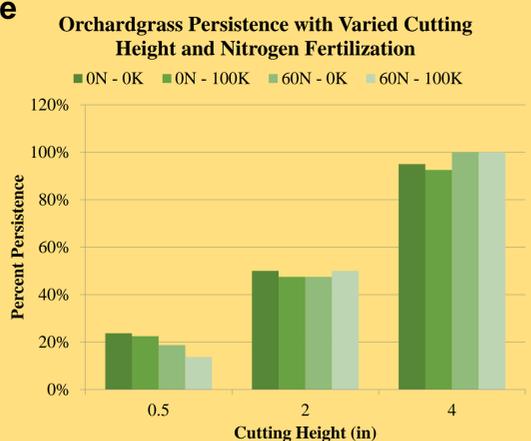
## Introduction

Forage researchers find it increasingly difficult to find motivated undergraduate students to conduct summer research. Over the last 10 years, I have developed a program to employ undergraduate science students from a local liberal arts school (Asbury University). Each science student is required to conduct a senior research project of their choosing in order to graduate. These students have majors ranging from pre-med to pre-dentistry to science education. I have found them to be highly motivated and glad to be working on real world research problems which have included the defoliation effect on forage grasses, simple cyanide testing systems, ergovaline detection in tall fescue, forages for organic dairies, and many more. This program has introduced over 20 basic science students to applied agricultural research and their senior projects have produced significant research and extension results that have benefited farmers across Kentucky.

## Results and Discussion

While this system has introduced over 20 basic science students to agricultural research, three projects have stood out recently as tremendous successes. Leah Saylor conducted a simple orchardgrass fertilization and cutting height plot study that yielded significant results and dramatic pictures frequently used in posters, publications and presentations. Anna Johnson used cyantesmo paper strips to develop a field level test for the presence of cyanide in warm season forages. Each year, we send over 50 of these kits out to county extension offices to use on farms; our extension administration funds these efforts because of the usefulness and demand for these tests. Finally, Erin Bell looked at ergovaline distribution in tall fescue plants; her findings support much of the information currently available, but also showed high concentrations in the base of the plant not usually shown in other research studies.

### Example 1. Orchardgrass Persistence



Leah Saylor set up a simple persistence study by mowing orchardgrass at ½", 2" and 4" throughout the summer and splitting plots with varied rates of nitrogen fertilizer. Her study found that even well fertilized stands could not recover from close mowing, while those areas mowed at 4" could stay productive even at low fertilizer rates, suggesting that cutting height has a significant impact on orchardgrass persistence in hay fields.

## Conclusions

Undergraduate students at liberal arts colleges provide a diverse and highly motivated population that may be interested and motivated to assist in forage research. While these students often have limited agricultural experience, they have been a great asset to our program. I believe they also leave our program with a better appreciation for agriculture and a healthy understanding of the scientific process.

## Materials and Methods

Each spring, I speak to the juniors enrolled in Asbury University's Senior Research Class and discuss research that I am currently working on. Those interested contact me and schedule a time to talk in more depth about their interests and abilities. I use this time in place of a formal interview, although students are asked to prepare a resume and list of references. Students are selected based on their interests in various projects as well as their ability to work in a fast paced environment, independently or with others, and their availability to work during critical harvest periods. Students are paid university dictated summer student rates from grant funding.

Each student's senior research project is developed from either current issues facing farmers, or components of more traditional research. Some students take on a portion of a larger, grant funded project while others are assigned a short, highly focused independent program. All students are also expected to assist with other research trials and extension events and programs. This provides us with an "on demand" work force for intensive sampling or for extension events such as field days. On less intensive days, students are divided up and sent to work on their individual projects or they work together as a team on each of their respective projects.

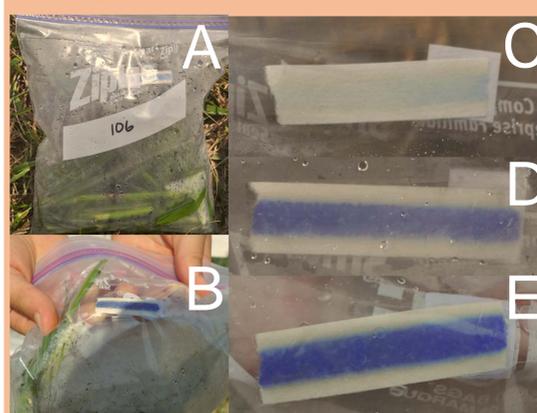
### Example 2. Ergovaline Distribution



1142 ppb ergovaline  
569 ppb ergovaline  
1717 ppb ergovaline

Erin Bell's senior research project investigated the distribution of ergovaline, a toxin produced by the wild type endophyte in tall fescue. It is well known that ergovaline is more concentrated in the stem and seedhead, but limited research was available that analyzed the bottom 3" of the plant. Erin found this area consistently contained higher concentrations than the seedhead, posing a risk to late term mares in overgrazed pastures.

### Example 3. Cyanide Field Test Kit



Anna Johnson used cyantesmo paper to develop a field test for cyanide in warm season forages. Samples are placed in a ziplock bag with the test strip attached (A), placed in the sun, and allowed thirty minutes to react (B). Each kit includes pictures C, D, and E as a colormetric scale. Photo C indicates little risk, D indicates a moderate risk, and samples with the darkest color (E) should not be grazed by livestock without additional testing.

## References

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- Greene, E. S.R. Smith, K. Cotten and D. Davis. 2013. Comparison of Ergovaline Concentration in BarOptima Plus E34 Tall Fescue and Control Varieties. American Forage and Grassland Council Annual Conference. Covington, KY. January 13-16.
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