



Mingyuan Chen was originally from Nanning, China. She received her undergraduate degree in Agricultural Engineering with a focus in Machinery from Purdue University. She then continued at Purdue to pursue a Master's Degree under Dr. Stroshine and Dr. Raman.

# Agricultural & Biological ENGINEERING

## Thesis Defense

- Speaker:** Mingyuan Chen
- Title:** Development of Pico Solar Crop Dryer (POD) for Farm Level Grain Drying by Small Holder Farmers in Africa
- Major Professor(s):** Dr. Richard Stroshine, Dr. Arvind Raman
- Date:** Wednesday, July 17, 2019
- Time:** 08:30 AM
- Location:** Flex B038

### Abstract:

For African farmers, proper drying is considered to be the biggest single factor in determining whether grain can be effectively stored without deterioration. The primary goal of the project is to develop and test the Pico solar crOp Dryer (POD). The ultimate goal of the project is to develop the POD to the point that it performs well and is acceptable to small holder farmers in Kenya and other developing countries. The shelled maize was placed in wooden or plastic trays and covered with plastic sheets. Several small fans of the type used for cooling electronics moved air through the dryer. Power was supplied by a 12 volt 20 Watt Solar Panel and a 12 volt 7 ampere hour lead acid battery. A charge controller allowed the fans to draw energy from both the solar panel and the battery. The POD was tested at Purdue from 2017 to 2019. The most recent test on freshly harvested maize was conducted in September 2018. The POD was able to dry 142 kg of 30.1% mc maize to 13.3% in 24.5 hours. In the summer of 2018, the components for assembling 5 sets of POD's were prepared and sent for testing in Kenya. The tests were conducted in Nandi in November 2018, and in Nakuru, Trans-Nzoia, and Uasin Gishu in March 2019. A simple mathematical model was developed to investigate the effects of weather condition and the airflow rate of the drying rate of POD.

### Application:

POD was developed for the small holder farmers in Kenya and other developing countries. Its adoption should lead to a reduction in post-harvest losses caused by improper drying. Although testing has been primarily focused on drying maize, it could be adapted for drying other crops.