

## **The effect of low temperature treatments on pistillate pecan flowers**

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Pecan (*Carya illinoensis*) is a popular high-quality nut with high economic value. Fluctuations in environmental conditions have a significant impact on pecan production. Spring freeze is one of the most severe problems threatening pecan bloom and production in Oklahoma. Our experiment aimed to study the effect of different low temperatures on female flower formation and development. Three pecan cultivars Kanza, Pawnee, and Maramec were used in this study. The shoot samples at different bud and flower growth stages were collected. Ten groups of samples were treated in five different temperatures (-6°C, -2°C, 0°C, 2°C, and 4°C) with two durations (4 and 8 hours), separately. The shoots were grown in growth chambers in pure water after the temperature treatment, mimicking historically average spring temperature and humidity conditions. Female flower qualities were observed at bloom and compared with control by scanning electron microscope (SEM) and fluorescence microscope. Our current experiment observed poor development of flowers due to -6°C and -4°C temperature. Although 4°C is not a freezing temperature, it had caused significant damage to pistillate flowers. At the early bloom stage, 4°C temperature treatment for 4 hours caused papillar cells' collapsing on the stigma surface. These stigmatic papillar cells play an essential role in successful pollination and fertilization as these cells act as a platform for pollen adhesion and germination. The results indicated that the pecan flower is more sensitive to a temperature beyond our traditional cognition. Our further study will examine how the stigma structure, stigma receptivity, and ovule viability are affected by spring freeze temperatures.

Keywords: Pecan, Temperature, Pistillate Flower, SEM