ESTIMATION OF BASE AND CEILING TEMPERATURES AND ACCUMULATION OF HEAT UNITS FOR OKRA TO PREDICT THE DATE OF HARVEST

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ABSTRACT

Studies were conducted in 1994, 1995 and 1996 growing seasons to determine the base and ceiling temperatures and to predict the harvesting date, based on heat unit summation, using coefficients of variation (CV) and standard deviation (S.D), for three okra (*Abelmoschus esculentus* L.) cultivars; i.e., Clemson Spineless, Baby Finger and Hala. The studies were carried out at the Agricultural Experiment Station, College of Agriculture, King Saud University, at Deirab near Riyadh. The heat unit model, developed by Perry *et al* 1986, was used to calculate the accumulated heat units. Six base temperatures (5, 7, 9, 11, 13 and 15°C) and six ceiling temperatures (25, 27, 29, 31, 33 and 35°C) were selected. A base and a ceiling temperature of 13 and 29°C gave the lowest CV and S.D, compared to the other examined temperatures, and were considered as the appropriate base and ceiling temperatures for the tested okra cultivars. These temperatures were used to calculate the heat unit summation required for different stages of harvesting periods. The results also included the prediction of harvesting date of okra for selected planting dates during February and March in Riyadh region.

INTRODUCTION

The concept of heat unit summations has been used for many years for predicting different stages of crop development, especially on crops that have a limited life span of quality in the field (Dufault, 1997). This concept was based on the direct relationship between temperature and different aspects of plant growth. Although Perry and Wehner (1990) reported that explaining the developmental and maturing process of a crop by merely using a temperature model was an over simplification, but they found that the heat unit modeling had a potential for operational application.

Boswell (1929) was the first to apply the heat summations relative to vegetable crop production, using peas. Different methods were evaluated by several scientists to calculate the heat unit requirement for several vegetable crops (cucumber: Perry *et al.*,1986, pepper: Perry *et al.*,1993; tomato: Wolf *et al.*, 1986; beans: Lorenz and Maynard, 1988). Arnold (1959) reported that the appropriate base temperature could be calculated by using heat unit summations from series of planting by choosing the base temperature, giving the smallest coefficient