Abstract

Given the importance of dry bean in Mexico and the need of know their production before the harvest, for the authorities of the agricultural sector, in order to define support to producers according to the expected harvest volume. The aim of this study was to develop an empirical model to estimate the yield of dry bean at the regional level prior to the harvest. An empirical dry bean (Phaseolus vulgaris L.) yield model that incorporates data on climate, leaf area index and yield components was developed for Zacatecas state, the major bean-producing area of Mexico, with 2005 data from 54 sampling sites planted with Negro San Luis, Flor de Mayo and Flor de Junio varieties of dry bean. Precipitation, leaf area index, number of pods per plant, grains per pod and plant, weight of 100 grains, plant density and grain yield data were obtained, and correlation and multiple regression analyses were made using 2005 data and the Statistical Analysis System (SAS) program. The model was validated with 2006 and 2007 data from 53 and 59 farmers’ sites, respectively, in Zacatecas. Additionally, it was tested with 2006 and 2007 data from 34 and 36 sites, respectively, in the adjoining state of Durango, whose bean varieties and climatic, farmland, and crop management conditions are similar to those of Zacatecas. The results were highly significant (p<0.0001, R²= 0.88), indicating that the model can be used for large-area yield prediction at least one month before the crop is gathered from the field in Zacatecas and Durango, which comprise over 850 000 ha for bean. The predictions can complement those made early in the growing season for this region. Further studies are needed to determine the applicability of the model and the methodology of prediction to other bean-producing regions with similar climate and management conditions.

Keywords

Dry bean, leaf area index, modeling, yield.