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Prediction of Full Blooming Dates of Major Peach Cultivars (Prunus persica) using the DVR and Chill Day Models

Jong Ahn Chun (1), Kwangmin Kang (2), Daeha Kim (1), Hyun-Hee Han (3), and In-Chang Son (3)

(1) APEC Climate Center, Busan, Korea, Republic Of (jachun@apcc21.org), (2) National Oceanic and Atmospheric Administration, 1325 East West Highway, Silver Spring, MD 20910, United States., (3) Department of Horticultural Crop Research, National Institute of Horticultural and Herbal Science, 100 Nongsaengmyeong-ro, Iseo-myeon, Wanju-gun, Jeollabuk-do, Republic of Korea

Recently, bud-burst and flowering dates of fruit crops showed a tendency to become earlier and an increase in the variabilities of temperature in spring lead to the high risk of frost damage to fruit crops. The projection of full blooming dates of fruit crops can be useful to plan fruit crop managements including fertilization and artificial pollination. The objective of this study were to develop temperature-based prediction models for full blooming dates of peach cultivars and to identify models to better predict those among the developmental rate (DVR) model, chill day model, and new chill day model. For the development of these models, bud-burst and full blooming dates of peach tree for the five cultivars (‘Cheonghong’ : chh, ‘Youmyeong’ : ymn, ‘Changbangjosaeng’ : cbj, ‘Cheonjoongdo’ : cjo, and ‘Janghowon’ : jhw) were collected from the six major peach cultivation sites (Chuncheon, Suwon, Cheongwon, Cheongdo, Naju, and Jinju). The new chill day models showed better prediction results for the entire dataset than the other models with the estimated parameters slightly different from the cultivars. The values of three goodness-of-fit measures for the new chill day model were 2.12%, 0.83, and 3.02 days for Mean Absolute Percentage Error (MAPE), R2 (coefficient of determination) and Root Mean Square Error (RMSE), respectively. However, it should be noted that the number of observations for the model development were different from the sites and cultivars and this could contribute to the differences of the parameters and performances. It is recommended that the models should be improved through increases in the number of observations for the cultivars at each site in the future.
Keywords: Developmental rate (DVR); chill day model; new chill day model; sequential dormancy model