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Blueberry is a high priced fruit crop because of its color, flavor and nutritional properties and has been increasingly cultivated in Japan. Highbush blueberry (*Vaccinium corymbosum* L.), one of blueberry species, can be grown in cool temperate regions such as hilly and mountainous areas of northern Japan. In our Field Science Center of Tohoku University, located in these areas, we have cultivated highbush blueberry since 1995 and the blueberry preserve is our leading product. However, the yield level of highbush blueberry in our center is unstable and unpredictable, probably depending on the course of spring and summer temperature. Here, we established simple growing degree-days models using temperature data and predicted the yield, the flowering and the harvesting dates of highbush blueberry.

Three highbush blueberry cultivars, Early Blue, Colins, Spartan were planted in the field of Field Science Center (lat. 38°44′30, N, 145°45′10, E, 165m elevation) in 1995 and seven cultivars (Bluejay, Patriot, Bluecrop, Blueray and three above-mentioned cultivars) were planted in 1998. We used these datasets of the yield, the flowering date, the starting and ending dates of harvesting from 1999 to 2014. We also used the datasets of the mean daily temperature (T) for model development, which were collected from AMeDAS station located next to the field.

To predict the flowering date, the starting and ending dates of harvesting using T, we established the simple growing degree-days models. In these models, if T is more than the base temperature (T_{base}), we accumulated T - T_{base} and if T is lower than T_{base}, we accumulated 0. We used 12 °C and 10 °C as the T_{base} for the flowering date and for the starting and ending dates of harvesting, respectively. In addition, for the starting date of harvesting, if T is more than 25°C, we accumulated 15°C. When the accumulated temperature reached each cultivar-unique degree, we assumed the date as the flowering date, the starting or ending dates of harvesting. To compare the predicted dates with actual ones, we used the datasets between 2005 and 2014 of highbush blueberry planted in 1998 for the exclusion of the effects of plant age. From these results, we could predict the flowering date, the starting and ending dates of harvesting using our proposed models.

Futhermore, to predict the yield using the flowering date, the starting and ending dates of harvesting, we used a multiple regression model. From this result, we could predict the yield using two durations: the duration between the flowering date and the starting date of harvesting and the duration between the starting and ending dates of harvesting. The predictions of the yield and the two durations using temperature data were not so accurate but statistically significant.

Finally, we extended the models combined with the plant growth function using plant age to apply to the immature highbush blueberry. With all datasets (1999-2014) from our field, the yield could be largely predicted except the yields were underestimated in 2000, 2011 and 2013 and the yield was overestimated in 2002. The variations of actual yield were much larger than that of the predicted yield.

In summary, we could predict the flowering date, the starting and ending dates of harvesting using temperature data of highbush blueberry and could also predict the yield with the actual data of flowering date, the starting and ending dates of harvesting. If the plant age is known, we might predict the yield in the immature plants.