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Climate Change Affects Traditional High-Altitude Fruit Production Systems in Oman

EIKE LUEDELING, JENS GEBAUER, ANDREAS BUERKERT

University of Kassel, Organic Plant Production and Agroecosystems Research in the Tropics and Subtropics, Germany

Abstract

The high-altitude fruit production systems of Al Jabal al Akhdar in Oman are unique in that they represent the only horticultural systems of the country, where farmers successfully grow temperate tree and shrub crops together with subtropical ones adapted to cool temperatures. To characterise the climatic conditions prevailing in the oases of this region, we investigated four oases along an elevation gradient from 1030 to 1950 masl. At the oases of Al ‘Ayn, Qasha’ and Masayrat ar Ruwajah, temperatures were measured at half-hourly intervals over a full cropping year, and interpolated for Salut, a fourth settlement at an intermediate altitude. At all oases, all trees were counted and classified according to species, climate preference and approximate chilling requirement.

From temperature measurements at the oases, we calculated the chill hours (temperatures below 7.2°C) at each location, and correlated these to daily measurements of minimum temperature from the nearby weather station at Saiq. From this correlation and historical temperature records at Saiq, seasonal chill hours for winters were estimated from 1983 to 2007.

Temperatures varied strongly with altitude, with mean annual temperatures of 24.7°C at the lowest and 18.7°C at the highest oasis. The lowest system was dominated by date palms (*Phoenix dactylifera* L.) and tropical species, whereas at the highest location pomegranates (*Punica granatum* L.) and roses (*Rosa damascena* Mill.) prevailed. Long-term temperature records indicated that the number of chill hours decreased markedly over the past 23 years. In our view, this decline is the most likely cause for the almost complete crop failure of pomegranate, peach (*Prunus persica* L.) and apricot (*Prunus armeniaca* L.) in the oases at intermediate altitude and very low yields of peach and apricot at Al ‘Ayn during the season of 2005/06. The rate of decline in chill hours is alarming, with the annual total at Al ‘Ayn decreasing by 22.7 hours per year, from 1134 hours in 1983/84 to less than 400 hours in all winters between 2003 and 2006.

Keywords: Al-Jabal-al-Akhdar, chilling requirement, climate gradient, oasis, pomegranate