Section 17.6   Horticultural Crops: Optimum Growth Areas

Background Information

- Passion fruit (Photos 1 - 3) are believed to have originated from southern Brazil (Kenyaweb, 2005).
- They also go by other common names of granadilla and purple granadilla (Kenyaweb, 2005).
- The most commonly commercially grown of 55 edible species of passion fruit is *Passiflora edulis*, which consists of perennial woody vines with each producing about 100 fruits per year (RBGK, 2005).

Site Requirements for Passion Fruit

- In South Africa passion fruit ideally requires a cool subtropical climate for optimum production (Smith, 1998).
- The vines prefer moderate temperatures throughout the year, with monthly means of daily maxima < 29°C.
- The plants are sensitive to severe frosts, and monthly means of minimum temperatures should be > 6°C (Smith, 1998; NDA, 2005).
- For commercial production under rainfed conditions MAP should ideally exceed 1 200 mm and be well distributed throughout the year (NDA, 2005), as it is important to maintain the soil moist throughout the growing season to keep the vines flowering and fruiting for longer periods and prevent the fruit from shriveling and falling prematurely (Kenyaweb, 2005; NDA, 2005; RBGK, 2005).
- Alternatively, rainfall needs to be supplemented by irrigation.
- In South Africa maximum water requirements for passion fruit are ~ 5 mm/day in summer (~ 15 litre/plant/day), reducing to approximately half that in winter months (NDA, 2005).
- While able to grow on a range of soils, the deep rooted granadilla display a preference for deeply prepared (~ 1 m) sandy loams with pH 6.5 - 7.5 and clay contents 10 - 40% (Kenyaweb, 2005).
- Soils should be well drained in order to prevent colour rot (NDA, 2005).

Production of Passion Fruit in South Africa

- Total commercial production of passion fruit in South Africa is ~ 1 300 t per season, with a range (between 1998/9 - 2003/4) in more recent from 900 - 1 700 t (NDA, 2005).
- The gross value is ~ R65 million/year (NDA, 2005).
- Approximately 73% of commercially grown passion fruit is sold on the country’s 17 fresh produce market and ~ 12% is purchased for processing (NDA, 2005).

Distribution Patterns over South Africa of Climatically Optimum Growth Areas for Passion Fruit

The composite map of climatically optimum growth areas for passion fruit shows a belt along the south and east coasts of South Africa, with the belt shifting inland to higher altitudes in KwaZulu-Natal, Swaziland and Mpumalanga. Some apparently anomalous optimum areas are probably artifacts of the six specific mapping criteria used and the accuracy with which the criteria could be mapped.
Determination of Climatically Optimum Growth Areas for Passion Fruit in South Africa

Using the various site requirements already discussed (Smith, 1998; Kenyaweb, 2005; NDA, 2005; RBGK, 2005), the criteria for climatically optimum growth areas for passion fruit were further refined by Bower (2005). Six criteria were identified and using the 1’ x 1’ gridded information on temperature related parameters derived by Schulze and Maharaj (2004), and described in Section 2.1 of this Atlas, the following criteria were mapped:

• **Criterion 1**: > 330 days per year with a minimum temperature exceeding 2°C
• **Criterion 2**: Fewer than 2 consecutive days per annum with minimum temperatures < -2°C
• **Criterion 3**: There should not be > 3 consecutive frost days per annum
• **Criterion 4**: In total, there should be < 25 days per annum with frost
• **Criterion 5**: Maximum temperatures should be < 28°C on at least 25 days of each month
• **Criterion 6**: Maximum temperatures should not exceed 35°C on any two consecutive days per month.

Mapped criteria were given either categorical or probabilistic weightings and when the six maps were superimposed, suitable and less suitable climatically optimum growth areas could be identified.

The assumption was made that for commercial production the passion fruit vines had access to irrigation if rainfall was inadequate.

References (In the sequence in which they appear in this Section, with the full references given in Section 22)

2. RBGK (2005)
4. NDA (2005)

Photo 1 - http://www.bushveld.co.za/pictures-of-flowers-South-Africa/granadillalg.jpg
Photo 2 - http://www.arc.agric.za/institutes/itsc/main/images/granadil.jpg
Photo 3 - http://www.cdc.gov/nccdphp/dnpa/5aday/images/passionfruit_v2.jpg

Citing from this Section of the Atlas

When making reference to this Section of the Atlas, please cite as follows:

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