*Food Chemistry* **49** (1994) 23–27

# Composition of babaco, feijoa, passionfruit and tamarillo produced in Galicia (North-west Spain)

**M. A. Romero-Rodriguez, M. L. Vazquez-Oderiz, J. Lopez-Hernandez and J. Simal-Lozano**

*Departamento de Química Analítica, Nutrición y Bromatologia, Facultad de Farmacia, 15706 Santiago de Compostela, La Coruña, Spain*

(Received 11 September 1992; revised version received and accepted 17 February 1993)

Basic compositional data are evaluated for the subtropical fruits (babaco, feijoa, passionfruit, and tamarillo) growing in Galicia (North-west Spain)

## INTRODUCTION

The climatic conditions of Galicia, North-west Spain (mild winters, warm summers, and persistent rain) are ideal for the cultivation of a range of unusual subtropical fruits. Among those currently being evaluated by horticulturalists are the babaco, the feijoa, the passionfruit, and the tamarillo, (Salinero *et al.*, 1985).

The babaco (*Carica pentagona* Heil) is a Caricacea native to the mountains of Ecuador, but which is now grown in some parts of New Zealand. The plant has a non-ramified stem, reaching a height of 1·5–2·5 m. The fruits emerge at the insertion of the leaf petioles, are green, ripening to yellow, and may reach 30 cm in length and 1·5 kg in mass. The fruit, which is pentagonal in transverse section, is very juicy and may contain a few soft seeds, which do not have to be removed before consumption. Each tree yields between 30 and 50 fruit (Williams, 1985; Cossio & Bassi, 1987; Bartley, 1988; Calabrese, 1988).

The feijoa (*Feijoa sellowiana* Berg) belongs to the Myrtacea family, which includes many tropical and subtropical plants of great economic importance. *Feijoa sellowiana* (or *Acca sellowiana*) is a native of South America (Uruguay, Argentina, Paraguay, and Brazil) introduced to Europe in 1890 via France, Spain, Italy, and Portugal. Around ten years later, it was also introduced to California and from there to New Zealand, where marketing of the fruit began. In Pontevedra (North-west Spain), there are several elderly examples of this species: in most cases, these are descendants of the first plants brought over from South America. The plant is woody, evergreen, and 2–4 m high. The fruits are round or ovoid, 3–8-cm-long, green–grey berries with a rough skin. The pulp is whitish, uniform or granular, with a pleasant aromatic flavour. There are a large number of very small seeds, which do not have to be removed before eating (Publiano, 1980; Azam *et al.*, 1981; Heywood, 1985; Salinero *et al.*, 1985; Mansilla *et al.*, 1989).

The passionfruit (*Passiflora edulis* Sims) is a member of the Passifloraceae; this family is native to tropical and subtropical regions but grows well in temperate climates. *Passiflora edulis* Sims, which originated in Brazil, is currently cultivated commercially in outdoor plantations in Galicia. The plant climbs with the aid of tendrils, springing from the same axils as the flowers. The fruits are round or ovaloid and apricot-sized (4–6 cm in diameter). When mature, they are deep purple with a thick, hard, dry skin; when this starts to wrinkle, they are ready to eat. They contain numerous small black seeds set in a yellowish, aromatic, slightly acid pulp (Bellini & Giovannoni, 1987; Genders, 1988; Salé, 1988; Salinero, 1990).

The tamarillo or tree tomato (*Cyphomandra betacea* Sendt.) is a Solanacea native to South and Central America. Commercial growing started in New Zealand. It is a tree species that grows 3–3·6 m high. The fruits are ovoid and smooth-skinned, are yellow (yellow tamarillo) or red (red tamarillo), and contain many small seeds. The pulp is also yellow or red, with a slightly acid taste, reminiscent of tomato (Rotundo *et al.*. 1981; Rotundo *et al.*, 1983; Rotundo, 1989; Pileri, 1989).

Here, we have determined a range of basic compositional parameters in samples of babaco, feijoa, passionfruit, and tamarillo growing in Galicia. The parameters determined were (in whole fresh fruit) weight, length, diameter, and texture; (in fresh fruit juice) soluble-solids content; (in homogenized fresh fruit) colour, pH, degree of maturity, vitamin C content, and water content; (in lyophilized fruit) total nitrogen, total fats, sucrose, D-glucose, D-fructose, neutral-detergent fibre, organic acids, ash, sodium, potassium, calcium, magnesium, iron, copper, zinc, manganese, and phosphates. We compare our data from Galicia with previously published data from other regions. It should be stressed

*Food Chemistry* 0308-8146/93/$06.00 

that the climate of Galicia is very different from that of Central and Southern Spain, and thus our results should not be over-generalized.

## MATERIALS AND METHODS

### Samples

Mature specimens of all four fruits were collected in 1989 from the Finca Do Areeiro fruit farm owned by the Diputación de Pontevedra. Three babaco samples were collected from the Kiwi España farm.

Six samples of each fruit were collected. For each samples of feijoa, passionfruit, and tamarillo, approximately 1 kg of fruit was collected. In the case of babaco, a mass of approximately 10 kg was collected. The parameters detailed below were determined.

*Whole fresh fruit*

Weight, length, and diameter were recorded.

Texture was determined with a penetrometer (an instrument that measures the resistance of fruit to penetration).

Ten fruits per sample were used in the determination of these parameters. The sample mean is the mean of these ten determinations.

*Fruit juice*

The soluble-solids content of fruit juice (pooled from ten fruits per sample) was determined as per the AOAC (1990): this is a physical method involving refractometry. The refractive index is converted, via a set of tables, into degrees Brix.

*Homogenized fresh fruit*

A mass of approximately 500 g of each sample was then homogenized for determination in triplicate of the following variables. The sample mean is the mean of these three determinations.

Colour was determined by using the simplified tristimulus method of the Comission Internationale de l'Eclairage (Simal *et al.*, 1986). This method involves determination of the dominant wavelength after measurement of the transmittance of an acetone extract of the sample at 444·4, 495·2, 551·8, and 624·2 nm. pH was determined with a Crison 2002 potentiometer, and total acidity by titration to pH 8·1 with NaOH (AOAC, 1990). The relationship between degrees Brix and total acidity was used to determined the degree of maturity of the fruit. Vitamin C was determined by a reverse-phase high-performance-liquid-chromatography (HPLC) method, with UV detection at 245 nm. (Romero *et al.*, 1992). Water content was determined by weighing before and after lyophilization.

*Lyophilized fruit*

The homogenized fresh fruit was lyophilized and the remaining variables were determined in triplicate. The sample mean is the mean of these three determinations.

**Table 1. Characteristics of babacos grown in Galicia (Northwest Spain) and babacos as reported in previous studies**

| Property \ Location of growth | Babaco | | | |
|---|---|---|---|---|
| | Galicia $X \pm$ SD | Ecuador (1) | New Zealand (1) | Italy (2) |
| Mass (g) | 755 ± 180 | — | — | — |
| Diameter (cm) | 8·3 ± 1·24 | — | — | — |
| Length (cm) | 25·3 ± 2·61 | — | — | — |
| Colour (nm) | 560–578 | — | — | — |
| Firmness (kg) | 4·2 ± 1·25 | — | — | — |
| pH | 4·0 ± 0·17 | — | — | 4·26 |
| Brix value | 7·5 ± 0·97 | — | — | — |
| Total acidity* | 0·7 ± 0·14 | — | — | 0·52 |
| RI1† | 11·6 ± 3·70 | — | — | — |
| Moisture (%) | 93·6 ± 1·16 | 93·3 | 93·0 | 92·8 |
| Proteins (%) | 0·7 ± 0·14 | 0·9 | 0·9 | 0·66 |
| Fat (%) | 0·02 | 0·1 | 0·2 | 0·1 |
| Total sugars | | 5·4 | 6·0 | — |
| Glucose (%) | 1·1 ± 0·22 | — | — | 2·54 |
| Fructose (%) | 1·0 ± 0·15 | — | — | 2·11 |
| Sucrose (%) | 1·5 ± 1·01 | — | — | 0·58 |
| Fibre (%) | 0·6 ± 0·22 | 0·5 | 0·7 | — |
| Citric acid (%) | 0·1 ± 0·3 | — | — | 0·16 |
| Malic acid (%) | 0·4 ± 0·04 | — | — | 0·57 |
| Quinic acid (%) | 0·03 ± 0·09 | — | — | — |
| Ash (%) | 0·3 ± 0·03 | — | — | — |
| mg/100 g f.w. | | | | |
| Vitamin C | 26·9 ± 3·44 | 29·0 | 31·0 | 22·6 |
| Sodium | 2·7 ± 1·17 | — | 1·3 | 1·9 |
| Potassium | 179 ± 24·9 | — | 220 | 154 |
| Calcium | 9·9 ± 2·01 | 11·0 | 12·0 | 8·3 |
| Magnesium | 15·3 ± 2·16 | — | 13·0 | 11·3 |
| Iron | 0·3 ± 0·07 | 4·0 | 3·4 | 0·4 |
| Copper | 0·1 ± 0·03 | — | — | — |
| Zinc | 0·08 ± 0·03 | — | 0·1 | — |
| Manganese | 0·08 ± 0·03 | — | 0·09 | — |
| Phosphates | 7·7 ± 1·40 | 14·0 | 17·0 | 10·1 |

(1) Cossio & Bassi (1987).
(2) Ferrara *et al.* (1989).
Results are expressed as mean ± standard deviation of six samples mean, except in the case of colour (expressed as range).
* Total acidity is expressed in (g malic acid)/100 g fresh weight).
† Ripeness is defined as (Brix value)/(total acidity).

Determination of total nitrogen, to provide an estimate of protein content, was carried out by using Kjeldahl's method (AOAC, 1990). Total fats were determined by continuous extraction with petroleum ether at 40–60°C in a Soxhlet extractor (AOAC, 1990). Sucrose, D-glucose, and D-fructose were determined by the Boehringer—Mannheim enzyme test no. 716 260. Neutral-detergent fibre was determined after the extraction of fats with detergents (Van Soest & Wine, 1967). Organic acids were determined by reverse-phase HPLC, UV/visible detection being employed at various wavelengths (Romero *et al.*, 1990). Ash content was determined after calcination of the lyophilized sample (AOAC, 1990) at 550°C. Sodium, potassium, calcium, magnesium, iron, copper, zinc, and manganese were de-

**Table 2. Characteristics of feijoas grown in Galicia (North-west Spain) and feijoas as reported in previous studies**

| Property \ Location of growth | Feijoa | | |
|---|---|---|---|
| | Galicia $X \pm SD$ | New Zealand (1) | New Zealand (2) |
| Mass (g) | 31·7 ± 3·43 | — | — |
| Diameter (cm) | 3·6 ± 0·14 | — | — |
| Length (cm) | 4·6 ± 0·24 | — | — |
| Colour (nm) | 571–574 | — | — |
| Firmness (kg) | 3·3 ± 0·42 | — | — |
| pH | 3·4 ± 0·39 | — | 3·7–3·90 |
| Brix value | 12·3 ± 1·18 | — | — |
| Total acidity* | 1·4 ± 0·20 | — | 0·80–1·60 |
| RI1† | 9·4 ± 2·45 | — | — |
| Moisture (%) | 83·4 ± 1·15 | 84·0–86·0 | 84·0–89·0 |
| Proteins (%) | 1·1 ± 0·05 | 0·50–1·00 | 0·70–0·90 |
| Fat (%) | 0·08 ± 0·01 | 0·30–0·40 | — |
| Glucose + fructose | 2·6 | 3·1 | 0·60–2·20 |
| Glucose (%) | 1·0 ± 0·23 | — | — |
| Fructose (%) | 1·6 ± 0·05 | — | — |
| Sucrose (%) | 5·0 ± 0·46 | 6·40–7·40 | 2·90–5·20 |
| Fibre (%) | 5·0 ± 0·46 | 4·80–4·30 | — |
| Citric acid (%) | 1·2 ± 0·30 | — | — |
| Malic acid (%) | 0·1 ± 0·03 | — | — |
| Quinic acid (%) | — | — | — |
| Ash (%) | 0·3 ± 0·01 | 0·20–0·40 | — |
| mg/100 g f.w. | | | |
| Vitamin C | 16·2 ± 0·17 | 25·0–36·0 | 28·0 |
| Sodium | 4·9 ± 0·35 | 0–9 | 5·0 |
| Potassium | 133 ± 15·1 | 90·0–170 | 166 |
| Calcium | 14·4 ± 3·7 | 4·5–8·0 | 4·0 |
| Magnesium | 7·7 ± 1·23 | 5·8–9·0 | 8·0 |
| Iron | 0·3 ± 0·08 | 0–0·2 | 0·05 |
| Copper | 0·1 | 0·02 | — |
| Zinc | 0·1 | 0·05–0·06 | — |
| Manganese | 0·2 ± 0·05 | 0·04–0·05 | — |
| Phosphates | 16·2 ± 0·94 | 10·0–17·0 | 10·0 |

(1) Visser & Burrows (1983).
(2) Azam *et al.* (1981).
Results are expressed as mean ± standard deviation of six samples mean, except in the case of colour (expressed as range).
* Total acidity is expressed in (g malic acid)/100 g fresh weight).
† Ripeness is defined as (Brix value)/(total acidity).

**Table 3. Characteristics of passionfruits grown in Galicia (North-west Spain) and passionfruits as reported in previous studies**

| Property \ Location of growth | Passionfruit | |
|---|---|---|
| | Galicia $X \pm SD$ | Unspecific origin (1) |
| Mass (g) | 36·8 ± 2·31 | — |
| Diameter (cm) | 4·5 ± 0·15 | — |
| Length (cm) | 4·7 ± 0·02 | — |
| Colour (nm) | 570–571 | — |
| Firmness (kg) | 6·5 ± 0·82 | — |
| pH | 3·3 ± 0·08 | — |
| Brix value | 14·1 ± 0·51 | — |
| Total acidity* | 2·1 ± 0·18 | — |
| RI1† | 6·6 ± 0·54 | — |
| Moisture (%) | 72·2 ± 0·37 | 80·1 |
| Proteins (%) | 3·0 ± 0·10 | 2·80 |
| Fat (%) | 0·12 ± 0·05 | 0·40 |
| Total sugars | | 13·4 |
| Glucose (%) | 2·1 ± 0·17 | — |
| Fructose (%) | 2·1 ± 0·15 | — |
| Sucrose (%) | 2·9 ± 0·23 | — |
| Fibre (%) | 12·8 ± 0·96 | 1·50 |
| Citric acid (%) | 3·0 ± 0·42 | — |
| Malic acid (%) | 0·3 ± 0·08 | — |
| Quinic acid (%) | — | — |
| Ash (%) | 0·5 ± 0·03 | — |
| mg/100 g f.w. | | |
| Vitamin C | 23·3 ± 2·37 | 20·0 |
| Sodium | 8·0 ± 0·92 | 28·0 |
| Potassium | 208 ± 15·0 | 350 |
| Calcium | 6·8 ± 0·74 | — |
| Magnesium | 27·9 ± 0·40 | — |
| Iron | 0·6 | 1·1 |
| Copper | 0·2 ± 0·05 | — |
| Zinc | 0·5 ± 0·04 | — |
| Manganese | 0·2 | — |
| Phosphates | 63·8 ± 1·35 | 54·0 |

(1) [a] Elmadfa et al. (1989).
Results are expressed as mean ± standard deviation of six samples mean, except in the case of colour (expressed as range).
* Total acidity is expressed in (g malic acid)/(100 g fresh weight).
† Ripeness is defined as (Brix value)/(total acidity).

termined by atomic-absorption spectrophotometry. Phosphates were determined by the addition of molybdate—vanadate reagent to a solution of ash in hydrochloric acid; phosphates were then determined by spectrophotometric measurement at 405·1 nm (AOAC, 1990).

## RESULTS AND DISCUSSION

The results of the various analyses and comparative data from Ecuador, Italy, and New Zealand are summarized in Tables 1 (babaco), 2 (feijoa), 3 (passionfruit), 4 (red tamarillo), and 5 (yellow tamarillo). Two factors make comparison difficult. First, to data there have been relatively few studies of the composition of these fruits. Second, those studies that have been published vary considerably in the parameters determined. It should also be noted that, in the case of most parameters previously, published results show considerable variability.

Data for babacos are available from Ecuador, New Zealand, and Italy. Out values for Iron and phosphates are considerably lower than those reported by Cossio & Bassi 1987) from fruit grown in Ecuador and New Zealand. Our values for glucose and fructose are lower than those reported by Ferrara *et al.* (1989) for fruit grown in Italy.

Data for Feijoa are available from New Zealand. In general, out values for carbohydrates and vitamin C are lower than those reported by Visser & Burrows (1983), but our values for calcium, copper, zinc, and

**Table 4. Characteristics of red tamarillos grown in Galicia (North-west Spain) and red tamarillos as reported in previous studies**

| Property \ Location of growth | Red tamarillo | | |
|---|---|---|---|
| | Galicia $X \pm SD$ | New Zealand (1) | New Zealand (2) $X \pm SD$ |
| Mass (g) | 62·6 ± 5·38 | — | — |
| Diameter (cm) | 4·6 ± 0·15 | — | — |
| Length (cm) | 5·5 ± 0·24 | — | — |
| Colour (nm) | 579–580 | — | — |
| Firmness (kg) | 3·1 ± 0·93 | — | — |
| pH | 3·6 ± 0·01 | 3·70–3·80 | — |
| Brix value | 11·1 ± 0·27 | 12·6 | — |
| Total acidity* | 1·8 ± 0·11 | 2·10–2·40 | — |
| RI1† | 6·0 ± 0·43 | — | — |
| Moisture (%) | 86·9 ± 0·12 | 81·0–82·0 | 87·0 ± 1·0 |
| Proteins (%) | 2·2 ± 0·02 | 2·0 | 2·0 ± 0·1 |
| Fat (%) | 0·08 ± 0·01 | — | 0·60 |
| Total sugars | | 6·60–6·80 | 5·30 |
| Glucose+fructose | 2·2 | 4·40–4·50 | 3·20 |
| Glucose (%) | 1·0 ± 0·23 | — | — |
| Fructose (%) | 1·2 ± 0·14 | — | — |
| Sucrose (%) | 2·5 ± 0·27 | 2·20–2·30 | 2·10 |
| Fibre (%) | 3·0 ± 0·15 | — | 3·90 |
| Citric acid (%) | 1·7 ± 0·03 | — | — |
| Malic acid (%) | 0·05 ± 0·01 | — | — |
| Quinic acid (%) | 0·4 ± 0·03 | — | — |
| Ash (%) | 0·7 ± 0·03 | — | 0·83 |
| mg/100 g f.w. | | | |
| Vitamin C | 21·9 ± 0·13 | 35·0–45·0 | 31·0 ± 7·0 |
| Sodium | 8·9 ± 2·90 | — | 1·6 ± 1·1 |
| Potassium | 347 ± 14·7 | — | 320 ± 40·0 |
| Calcium | 9·2 ± 1·09 | — | 11·0 ± 2·0 |
| Magnesium | 19·7 ± 1·80 | — | 21·0 ± 3·0 |
| Iron | 0·4 ± 0·05 | — | 0·6 ± 0·1 |
| Copper | 0·2 ± 0·05 | — | 0·05 |
| Zinc | 0·2 ± 0·03 | — | 0·10 |
| Manganese | 0·1 | — | 0·11 |
| Phosphates | 33·9 ± 3·32 | — | 39·0 ± 9·0 |

(1) Cacciopo (1984).
(2) Visser & Burrows (1983).
Results are expressed as mean ± standard deviation of six samples mean, except in the case of colour (expressed as range).
* Total acidity is expressed in (g malic acid)/100 g fresh weight).
† Ripeness is defined as (Brix value)/(total acidity).

**Table 5. Characteristics of yellow tamarillos grown in Galicia (North-west Spain and yellow tamarillos as reported in previous studies**

| Property \ Location of growth | Yellow tamarillo | | |
|---|---|---|---|
| | Galicia $X \pm SD$ | New Zealand (1) | New Zealand (2) $X \pm SD$ |
| Mass (g) | 42·7 ± 2·75 | — | — |
| Diameter (cm) | 3·9 ± 0·06 | — | — |
| Length (cm) | 5·6 ± 0·12 | — | — |
| Colour (nm) | 575 | — | — |
| Firmness (kg) | 2·0 ± 0·20 | — | — |
| pH | 3·2 ± 0·35 | 3·70 ± 3·80 | — |
| Brix value | 10·0 ± 0·52 | 13·2 | — |
| Total acidity* | 1·80 ± 0·27 | 1·90–2·10 | — |
| RI1† | 5·2 ± 0·66 | — | — |
| Moisture (%) | 87·8 ± 0·88 | 82·0–84·0 | 86·0 ± 1·0 |
| Proteins (%) | 2·5 ± 0·19 | 2·2 | 2·0 ± 0·2 |
| Fat (%) | 0·05 ± 0·005 | — | 0·50 |
| Glucose+fructose | 1·2 | 3·90 | 3·20 |
| Glucose (%) | 0·5 ± 0·1 | — | — |
| Fructose (%) | 0·7 ± 0·14 | — | — |
| Sucrose (%) | 1·6 ± 0·26 | 2·30 | 0·30 |
| Fibre (%) | 4·3 ± 0·49 | — | 6·00 |
| Citric acid (%) | 1·8 ± 0·11 | — | — |
| Malic acid (%) | 0·07 ± 0·010 | — | — |
| Quinic acid (%) | 0·8 ± 0·06 | — | — |
| Ash (%) | 0·7 ± 0·02 | — | 0·77 ± 0·05 |
| mg/100 g f.w. | | | |
| Vitamin C | 19·7 ± 0·25 | 30·0–35·0 | 31·0 ± 3·0 |
| Sodium | 4·9 ± 0·66 | — | 1·3 ± 0·7 |
| Potassium | 404 ± 47·1 | — | 290 ± 60·0 |
| Calcium | 10·6 ± 0·05 | — | 10·0 ± 4·0 |
| Magnesium | 22·3 ± 2·09 | — | 20·0 ± 2·0 |
| Iron | 0·4 ± 0·03 | — | 0·45 ± 0·1 |
| Copper | 0·2 ± 0·06 | — | 0·07 |
| Zinc | 0·2 | — | 0·18 |
| Manganese | 0·1 | — | 0·20 |
| Phosphates | 36·2 ± 2·50 | — | 40·0 ± 1·0 |

(1) Cacciopo (1984).
(2) Visser & Burrows (1983).
Results are expressed as mean ± standard deviation of six samples mean, except in the case of colour (expressed as range).
* Total acidity is expressed in (g malic acid)/(100 g fresh weight).
† Ripeness is defined as (Brix value)/(total acidity).

manganese are higher. Our values for glucose, fructose, calcium, iron, and phosphates are higher than those reported by Azam *et al.* (1981), also for fruit grown in New Zealand, but our values for potassium and vitamin C are lower.

In the case of passionfruit, our values for moisture content, sodium, potassium, and iron are lower than those reported by Elmadfa *et al.* (1989), whereas our values for fibre and phosphates are higher.

Data for tamarillos are available from Italy and New Zealand. In the case of both red and yellow tamarillos, our values for glucose, fructose, and vitamin C are lower than the values reported by Cacioppo (1984) and Visser & Burrows (1983) for fruit grown in New Zealand. Our values for sucrose in yellow tamarillo are lower than those reported by Cacioppo but higher than those reported by Visser & Burrows. Again, for both red and yellow tamarillos, our values for fibre were lower than those reported by Visser & Burrows, but our values for sodium and copper were higher. Our values for potassium in yellow tamarillo were also higher than those reported by Visser & Burrows and those for moisture content in both red and yellow tamarillos were higher than those reported by Caccioppo.

By comparison with all previously published data, we found low fat content in all four fruits.

## REFERENCES


Association of Official Analytical Chemists (1990): Official Methods of Analysis (14th edition). Association of Office Analytical Chemists, Arlington, VA, USA.

Azam, B., Laffitte, F., Obry, F. & Paulet, J. L. (1981). La Feijoa en Nouvelle-Zélande. *Fruits*, **36**, 361–81.

Bartley, J. P. (1988). Volatile flavor components in the headspace of the babaco fruit (*Carica pentagonia*) *J. Food Sci.*, **53**, 138–40.

Bellini, E. & Gioavannoni, G. (1987). La coltura delle passiflore, specie fruttifere tropicali e subtropicali. *L'Informatore Agrario*, **42**, 61–8.

Cacioppo, O. (1984). *La Feijoa (Feijoa sellowiana)*. Reda, Italy.

Calabrese, F. (1988). Babaco: quale destino? *Frutticoltura*, **10**, 63–5.

Cossio, F. & Bassi, G. (1987). Alcune osservationi sul babaco in Italia e all estero. *Frutticoltura*, **3**, 45–53.

Elmadfa, I., Aign, W., Muskat, E., Fritzsch, D. & Cremer, H. D. (1989). *La. gran guía de la composción de los alimentos*. Oassis, Barcelona, Spain.

Ferrara, E., Giorgio, V. & Gherardi, S. (1989). Aspetti qualitative dei frutti di babaco (*Carica pentagona* Heil.) prodotti in Puglia. *Frutticoltura*, **7**, 67–9.

Genders, R. (1988). *Plantas silvestres comestibles*. Blume, Barcelona, Spain.

Heywood, V. H. (1985). *Las plantas con flores*. Reverté, Barcelona, Spain.

Mansilla, J. P., Vazquez, R. A., Salinero, M. C. & Abelleira, A. (1989). Frutos exóticos. *Galicia DOA*, **1**, 46–50.

Pileri, A. M. (1989). Il tamarillo. *Rivista di frutticolture*, **11**, 67–70.

Pugliano, G. (1980). La Feijoa. *Estratto da Frutticoltura*, **XLII** (9), 51–4.

Romero Rodriguez, M. A., Gonzalez Rodriguez, V., Lage Yusty, M. A., Lopez Hernandez, M. J., Paseiro Losada, P. & Simal Lozano, J. (1990). Identificación y cuantificatcón por HPLC de los ácidos mayoritarios en frutas. *Anal. Bromatol.*, **XLII**, 299–306.

Romero Rodriguez, M. A., Vazquez Oderiz, M. L., Lopez Hernandez, J. & Simal Lozano, J. (1992). Determination of Vitamin C and Organic Acids in Various Fruits by HPLC. *J. Chromatog. Sci.*, **30**, 433–7.

Rotundo, A. (1989). Il tamaillo nello frutticoltura meridionale: quali prospective?. *Inf. Afrar.*, **XLV**(21), 41–3.

Rotundo, A., Raffone, C. & Rotundo, S. (1981). Una prova di coltura del tamarillo in Campania. *Frutticoltura*, **XLII**(6), 41–6.

Rotundo, A., Rotundo, S. & Gherardi, S. (1983). Il tamarillo. *Frutticoltura*, **XLV**(8), 37–40.

Sale, P. R. (1988). *Passionfruit Culture*. Ministry of Agriculture and Fisheries. Wellington, New Zealand.

Salinero, M. C. & Lema, M. J. (1990). La frambuesa. *Albariza*, 2.

Salinero Corral, M. C., Mansilla, J. P., Vazquez, J. P. & Abelleira Argibay, A. (1985). *La feijoa*. Servicio Agrario de la Excma. Diputación Provincial de Pentevedra, Spain.

Simal Lozano, J., Lopez Hernandez, J. & Vazquez Oderiz, M. L. (1986). Controbución al estudio sobre el Pimiento de Padrón. III. Determinación del color. *Técnicas de Laboratorio*, **132**, 453–6.

Van Soest, P. J. & Wine, R. H. (1967). Use of detergents in the analysis of fibrous feeds. IV: Determination of plant cell-wall constituents. *J. Assoc. Off. Anal. Chem.*, **50**, 50–5.

Visser, F. R. & Burrows, J. K. (1983). Composition of New Zealand foods. I: Characteristic fruits and vegetables.

Bulletin of New Zealand Department of Scientific and Industrial Research No. 235.

William, D. (1985). *Home Fruit Growing in New Zealand*. Government Printing Office, Wellington, New Zealand.