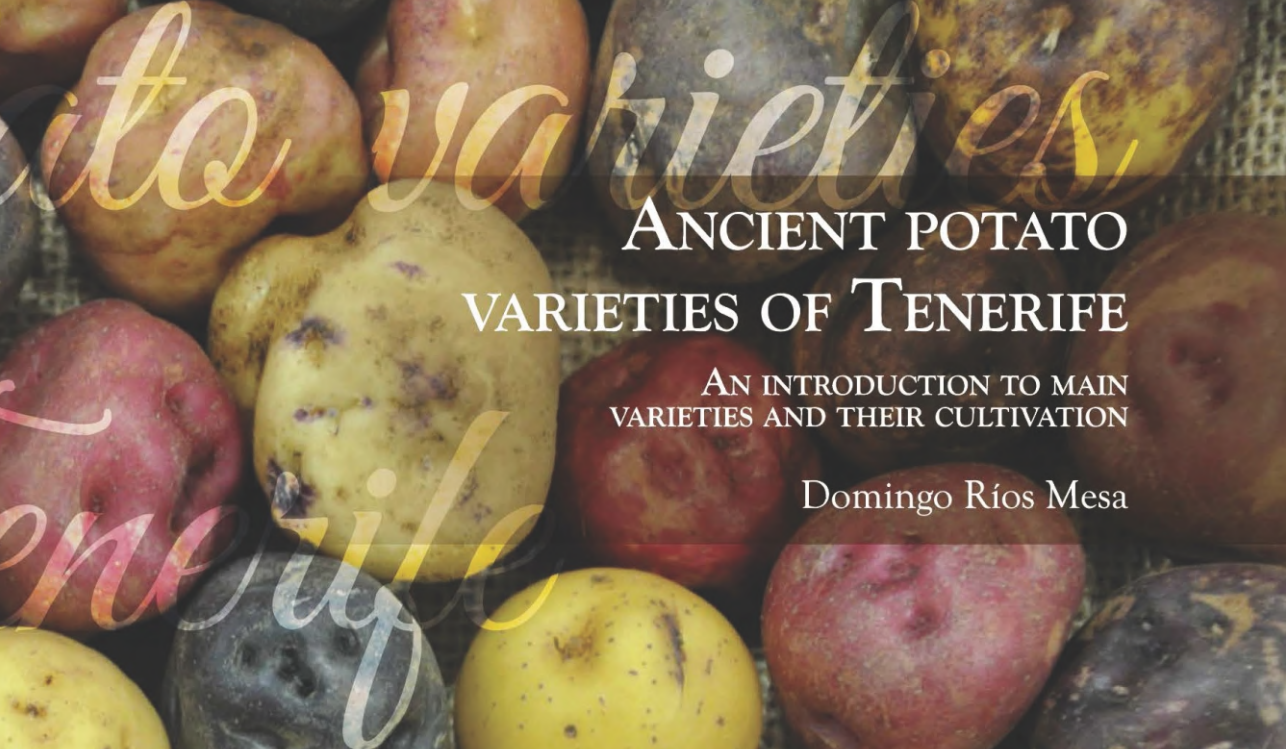

Ancient potato varieties of Tenerife

An introduction to main varieties and their cultivation

Domingo Ríos Mesa

Ancient pot

of T

Edita Centro Conservación de la Biodiversidad Agrícola de Tenerife.
Servicio Técnico de Agricultura y Desarrollo Rural. **Cabildo de Tenerife.**

Autor Domingo Ríos Mesa
Fotografías Centro Conservación de la Biodiversidad Agrícola de Tenerife
Diseño y maquetacón Gráficas Sabater
Imprime Gráficas Sabater

ISBN 978-84-15012-01-6
Depósito Legal Tf 434-2012

tato varieties

Ancient potato varieties of Tenerife

An introduction to main varieties and their cultivation

Domingo Ríos Mesa

Tenerife

INDEX

PROLOGUE

We have in our hands a work that collects and analyses in a few lines a whole culture and way of understanding the countryside and nature, one that has resisted, even through the most difficult times. Times in which the rural world has suffered a severe deterioration, leaving, in many cases, dryland crops reduced to a minimal part of what they were in the past. It is in these circumstances where potatoes have taken on a symbolic role as fundamental and inseparable parts of the islands' culture.

Domingo Ríos shows us a detailed study by regions, varieties and links with Andean culture in an interweaving of culinary, agricultural, and cultural aspects that have taken root on the islands. In each locality, potatoes are part of each family and each hamlet; the seeds of each variety are almost heirlooms. Indeed, potatoes are much more than a crop; they are craft elements deeply rooted in customs and traditions.

Domingo makes a journey analysing the morphological characteristics, from the colour, through the textures, and reaching the planting times marked by tradition. The "papas bonitas" (pretty potatoes) are the potatoes of the trade winds, from the mid-altitude lands, which account for more than 80% of Canary Island production. To talk about "coloured potatoes" in the Canary Islands is to talk about the north of Tenerife, since only in Lanzarote and La Palma are there still some isolated crops of these ancient Andean potatoes.

The Association of Ancient Potatoes of the Canary Islands and the Cabildo of Tenerife have made a great effort to achieve the designation of origin that Domingo's work supports. It is a well-deserved recognition of our heritage in a society that has too often devalued its rural life, both culturally and economically. This is a culture that travels back and forth between the Canary Islands and the Americas due to the number of varieties

and systems of maintaining seeds by exchanging them between zones horizontally or vertically. There are also the traditional techniques of three-leaf cultivation to maintain soil fertility (cereal, legumes and potatoes) and cultivation in fields associated with forested areas (chestnut, *monteverde*,...). Andean potatoes are ideal for the winter conditions in Tenerife's mid-altitude lands since they are not grown for several months. There are also rustic, hardy varieties, in which each potato has numerous shoots, giving them a greater capacity to survive against wind and drought.

Coloured potatoes are part of the hallmarks of Canary Island cuisine, in particular, they are a reference that gives personality to the north of Tenerife. A plate of wrinkled coloured potatoes and a local wine are part of our identity, they are part of the living archives of our emigrants. They are not just a dish, they are an encounter with our history and our culture, they are part of our ancestors that survives today.

This book is a meeting between yesterday and tomorrow. Domingo puts right numerous oversights in the recent history of this land. He will surely continue to rescue popular wisdom from the rich well of the rural world. Congratulations and thank you.

Wladimiro Rodriguez Brito
Professor of Geography at ULL

THE POTATO

The Canary Island potato is one of the most emblematic foods of the Canarian culture. It is part of a multitude of dishes and an almost daily companion in islanders' meals, either fried, boiled or "arrugada"[1]; the latter being the most traditional form of consumption among the people of Tenerife.

For centuries, Canary Island farmers have conserved a group of ancient varieties of great patrimonial, social and culinary value, especially on the island of Tenerife. The importance of these Tenerife potato varieties in our agriculture is enormous. Indeed, Tenerife has the largest surface area in the Canary Islands, some 1,000 ha, devoted to the cultivation of these ancient varieties (Ríos et al., 1999). However, these varieties are beginning to be in danger of extinction, basically because the entire Canary Island potato crop has suffered from the pest known as "Guatemalan moth" in recent years, as well as other new diseases. Therefore, the Cabildo Insular de Tenerife (Island Government), through its Centre for the Conservation of Agricultural Biodiversity of Tenerife, has collected more than 120 potato varieties from the Island's potato producing areas.

The word potato originally comes from Quechua and Yunga, that is, from the languages that were and are still spoken in the Andean region. As described by Ríos et al. (1999), in mainland Spain the word "*patata*" is commonly used. However, throughout South America, Central America, the Canary Islands and even in some areas in the south of the mainland the word "*papa*" is mostly used. This is because on its initial arrival in mainland Spain, it was known by the name of "*papa del Perú*", "*papa americana*" or simply "*papa*".

[1] The term "wrinkled" refers to the cooking of potatoes in their skins with a significant amount of salt.

Francisco Lopez de Gomara in 1552, in his "Historia General de Las Indias", mentions for the first time the word "*papa*" when he describes the Andean zones of Peru:

> "*Men have lived in this valley for hundreds of years and eat corn and roots similar to earthen truffles, which they call potatoes.*"

According to philologist Régulo Pérez (1973), the use of the word *patata* was caused by a confusion in pronunciation with the sweet potato or *batata* (a word originating from the Arawac Indians of the Caribbean area), since "the fluctuation between the initial phonemes 'b' and 'p' is a well-known phenomenon in Hispanic dialectology". The sweet potato was known before the potato. It was Christopher Columbus who introduced it to Spain before 1516, from where it spread to other European countries. For several centuries, both sweet potato and potato were used to designate the sweet root, and when potatoes arrived in Europe, due to their similarity, they were given the same name. In Spain, the word "*patata*" settled definitively, while in Portugal the potato is still called "*batata*" and the sweet potato "*batata dulce*"; and in France the names "*patate*" for the sweet potato and "*pommes de terre*" for the potato are still preserved. According to Doyle (1797), in mainland Spain the name "*papa*" was used for the *solanaceae* and "*batata*" or "*patata*" for the *convolvulaceae* until the first half of the 18th century, and later the terms "*papa*" and "*patata*" were used simultaneously to designate potatoes. This could cause some confusion when studying the history of this crop in Europe, especially in early references to them after their entry into the old continent.

In addition, in certain areas of Tenerife, such as Icod el Alto, there are still names that are currently used by the farmers of the Andes, such as the words "*troja*" to designate the potato store or "*bonitas*", translation of the Quechua word of the same meaning, to designate certain potato varieties of Andean origin

that are mostly cultivated in this place. In a recent visit to Tenerife, the taxonomist Alberto Salas from the International Potato Centre of Peru found enormous similarities between the varieties, cultivation, uses and customs of the potatoes of Peru and those of Tenerife.

For some years now, the Association of Ancient Canary Island Potatoes, together with the Island Council of Tenerife and other public and private institutions, have been carrying out an extremely important informative work. Indeed, the Association has played a key role in achieving the protected designation of origin "*Papas Antiguas de Canarias*", which is becoming more well known.

It is also worth mentioning the scientific and technical work that has been carried out in recent years by the University of La Laguna, the Centro Internacional de la Papa (CIP), NEIKER (former Estación de la Patata de Álava) with the support of the Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (National Institute of Agricultural and Food Research and Technology). In recent years, the projects Interreg III-B Germobanco Agrícola de la Macaronesia and AGRICOMAC, whose leader has been the agrarian organization ASAGA, have also facilitated the work that was being carried out.

HISTORY OF THE POTATO: ITS ARRIVAL IN THE CANARY ISLANDS AND EUROPE.

According to Harlan (1992) and Hawkes (1990), the potato was cultivated some 10,000-15,000 years ago in the Andean zone, specifically in southern Peru and northern Bolivia (Ugent, 1970). It was grown on the valley terraces of the ancient capital of the Incas, Cuzco. The first farmers in these areas selected these tubers for their flavour and texture, for their lower alkaloid content and, generally, for their colour. This region is the centre of origin of the potato, where some individual farmers still cultivate more than 400 potato varieties in their "chacras" (small farms or vegetable gardens). The ancient varieties are cultivated in the American continent from the north of Argentina to Mexico, although in Mexico, varieties of Andean origin were introduced by the Spaniards.

PHOTO1: Potato flower

The potato arrived in Europe in the 16th century through the Canary Islands, according to documentation found in these islands that refers to the entry of these tubers from South America. The first reference dates from 1567 and is from a notary public, who attests to the shipment of goods from Gran Canaria to Antwerp (Lobo, 1988):

> *"... And I also receive three medium-sized barrels of potatoes and oranges and green lemons."*

A few years later, in April 1574, we find a similar citation, in this case referring to a shipment from Tenerife to Rouen (France) (Hawkes and Francisco-Ortega, 1993):

> *"... Likewise, two barrels of potatoes and eight (...) full of aguardiente came from Tenerife."*

In continental Europe, the oldest reference is found in the accounting books of the Hospital de

Sangre de Sevilla in the Archivo Hispalense (Hawkes and Francisco-Ortega, 1992), where the entry of a shipment of potatoes appears in 1573. According to these authors, it is probable that the introduction was somewhat earlier, around 1562. For the great Peruvian taxonomist D. Carlos Ochoa, it is possible that it was prior to this date, specifically between 1550 and 1560 (personal communication) since there are indications of potato shipments from Cuzco to Spain. In any case, it seems that the entry of potatoes to Europe was mainly through the Canary Islands.

Regarding the introduction and cultivation of potatoes in the Canary Islands, Bandini (1816) takes up what Viera y Clavijo stated in his Diccionario de Historia Natural de las Islas Canarias, which was published in 1866. This reference states that it was D. Juan Bautista de Castro who first planted potatoes on his lands in Icod el Alto, having brought them from Peru in 1622. It is, therefore, the first reference to the introduction of potatoes in the Canary Islands recorded in a written work and the first where the beginning of their cultivation is indicated. It should not be forgotten that Icod el Alto is one of the areas of the Canary Islands with the deepest roots regarding the cultivation of our ancient potatoes, and with an agro-system reminiscent of that where potatoes are grown in the Andes.

For centuries, numerous varieties of potatoes arrived from the American continent, some of which are still cultivated on Tenerife. Even today, potatoes of Andean or Venezuelan origin are still being introduced, some of which are improved varieties. As for white or commercial seed potatoes, here we define them as those that normally come from foreign seeds; farmers acquire seed potatoes from the United Kingdom, Ireland or Denmark for later planting. These varieties can be of various colours and shapes: white-skinned with purple spots such as Cara, King Edward, Red Cara and Merlin; red-skinned such as Rosada or Kerr's Pink, Druid and Rooster; or totally white-skinned ones such as Up to Date, Valor, Slaney and Avondale.

PHOTO2: Commercial variety Cara

PHOTO3: Commercial variety Druid

PHOTO4: Cultivation of potatoes and associated cereals in Tenerife

BOTANY

Potatoes belong to the *Solanaceae* family and to the genus *Solanum* of which about 1,000 species are known and more than 200 are tuberous. According to Hawkes (1990), there are seven cultivated species of potatoes, including seven subspecies, which belong to the genus *Solanum*, subgenus *Potatoe*, section *Petota*, subsection *Potatoe*. However, this classification has been much discussed. Thus, Ochoa (1999) establishes 9 species and 141 subspecies, varieties or forms. A new classification made by Huaman and Spooner (2002) classifies all cultivated species as *Solanum tuberosum*, dividing them into the following groups: *Andigenum*, *Chilotanum* and *Chaucha*. In any case, according to Zubeldia et al. (1957), Gil (1997) and Ríos (2002), the existing species in the Canary Islands are the following:

-*Solanum tuberosum ssp. andigena*, which is represented by varieties of Andean origin.

-*Solanum chaucha*, the black potato or Negra Yema de Huevo (egg yolk black potato).

-*Solanum tuberosum ssp. tuberosum*, which includes the rest of the varieties cultivated on Tenerife.

The potato is an herbaceous species, perennial for its tubers, but of annual cultivation. It consists of numerous stems that are more or less erect, green or brownish, depending on the absence or presence of anthocyanins, on which, alternately, leaves composed of 7-15 primary leaflets are arranged.

The flowers, which are pentamerous (5 petals, 5 sepals, 5 stamens and 1 ovary), are grouped in terminal inflorescences. They are usually autogamous (self-pollinated), although there is a very high percentage of sterile cultivars. Colour diversity is very large, and thus, in the Andean varieties in the Canary Islands, colour usually varies between pale blue and violet, with some pinkish hues.

The fruit is a spherical or ovoid berry, like a small tomato, 1-3 cm in diameter, green or purplish. Inside are dozens of small, flattened seeds, covered with mucilage. Potatoes are rarely reproduced by seed, which are usually only used in breeding.

Potatoes are not the fruit of the plant; they are underground stems thickened by the accumulation of starch that have the capacity to produce new plants. This explains why they turn green when exposed to light as do the stems of any plant.

PHOTO5 : Potato flower White Lily

PHOTO6: Flower of the variety Negra Yema de Huevo

PHOTO7: Plant of the variety Colorada de Baga

NUTRITIONAL VALUE OF POTATOES.

Potatoes are mainly composed of sugars, proteins and lipids. Sugars represent about 20 % of the fresh matter, proteins 2 % and lipids 0.1 %. Among the carbohydrates, starch represents 70 % of the dry matter, while reducing sugars, glucose and fructose, based on a freshly harvested potato, range from 0.5 to 2 % (Burton, 1989).

TABLE 1 Shows the different mean values of potato nutritional parameters:

Component			% fresh material	% dry material	mg/100 g fresh mat.
Energy value					80 kcal.
Water			77.5		
Dry material			22.5		
Proteins			2.0		
Lipids			0.1		
Ashes			1.0		
Total carbohydrates (sugars):			19.4		
Starch			15.7	70	
Sucrose*			0.1 – 0.2	0.5 – 1.0	
Glucose. fructose (reducing sugars)*			0.07 – 0.45	0.5 – 2.0	
Crude cellulose				2.0 – 4.0	
Pectins				2.5	
Citric acid				1.0	
Vitamins:	Thiamine (B1)				0.11
	Riboflavin (B2)				0.04
	Nicotinamide (B3 or PP)				1.2
	Pantothenic acid (B5)				0.3
	Pyridoxine (B6)				0.2
	Ascorbic acid (C)	New potato			40
		After 3 months			15
		After 6 months			5
Minerals:	Sulphur				29
	Calcium				14
	Chlorine				35
	Cobalt				0.01
	Copper				0.16
	Phosphorus				53
	Iron				0.8
	Iodine				0.03
	Magnesium				27
	Manganese				0.17
	Potassium				410
	Sodium				3

*These values correspond to potatoes harvested at full maturity and not stored. The content of soluble sugars depends greatly on the degree of maturity and storage conditions of the tubers. Based on: Talburt and Smith (1987); Burton (1966 and 1989) and Grison (1981) cited by Gravoueille (1999).

The parameters most used internationally to characterize the physicochemical and organoleptic quality of potatoes are reducing sugars, texture and dry matter.

a. Reducing sugars.

The reducing sugar content of potatoes is influenced by several factors:

- Varieties with lower dry matter content have more reducing sugars.
- The sugar content is minimal at the end of the production cycle and increases during storage.
- Low temperatures and abundant rainfall increase the content of reducing sugars.
- Temperatures below 6ºC during storage cause caramelization or hydrolysis of part of the starch, which causes the potatoes to turn a dark colour when fried.

b. Texture and dry matter

The European Association for Potato Research (EAPR) defines tuber texture in terms of four factors that can be determined by organoleptic analysis (tasting): consistency, mealiness, dryness and graininess. Most of these parameters are related to the dry matter content and the type of variety.

The tendency of the flesh to either disintegrate or be consistent during cooking is a qualitative characteristic of key importance, and is related to high dry matter content, since potatoes swell and tend to disintegrate when cooked. For this reason, the evaluation of the percentage of dry matter of the tubers is a factor that specialists consider is decisive in evaluating the consistency, mealiness and graininess of the flesh. Potatoes with a high dry matter content tend to be mealy.

The dry matter content of potatoes depends on the variety, climatic conditions, soil type and cultivation techniques.

Farmers and market traders on the island tend to differentiate between rainfed and irrigated potatoes, although this may also depend on other factors such as solar radiation and temperature conditions. In general,

the various experiments carried out to date do not seem to draw scientific conclusions. However, folk wisdom is of vital importance, and shows the accumulated experience of many generations. The dry matter is particularly interesting in potatoes consumed in stews, since it is in this method of cooking that they show the greatest or least mealiness.

In all the studies carried out in the Canary Islands, the old potatoes have dry matter levels above 22%, except for the Negra Yema de Huevo which, being creamier, has a dry matter content normally somewhat lower, and which can range between 20% and 24%. There are cultivars, such as the Borralla, which reach very high values of dry matter, more than 32% according to some analyses.

In Tenerife, when referring to the texture of wrinkled potatoes, we say that they are "flowered", "*fluren*" or "*florecen*", that they are "sugary", that they are "*aguachentas*" or "*aguadas*", "*eslabadas*", pasty, "*gofientas*" or "*gofiaditas*", potatoes "*con masa*", etc. (Gil, 1997; Ríos et al.,1999).

TABLE 2 shows the energy and nutritional value per 100 g of a portion of some potato-based products:

Form of preparation	Calories	Water (g)	Carbohydrates (g)	Protein (g)	Fats (g)
Boiled with skin	76	79.8	17.1	2.1	0.1
Baked	93	75.1	21.1	2.6	0.1
Mashed with milk and butter	94	79.8	12.3	2.1	4.3
Dehydrated mashed potatoes	96	78.6	14.4	2.0	3.6
Fried	274	44.7	36.0	4.3	13.2
"Chips"	568	1.8	50.0	5.3	39.8

Talburt and Smith (1967) cited by Gravoueille (1999).

In recent years, the Department of Analytical Chemistry, Nutrition and Bromatology of the University of La Laguna, in collaboration with the Centre for the Conservation of Agricultural Biodiversity of Tenerife, has carried out numerous studies on the nutritional and bromatological value of Tenerife's coloured potatoes, which have made it possible to define the differentiated quality of our potatoes.

ECOLOGY AND DISTRIBUTION.

The distribution of potatoes in Tenerife clearly depends on the different agrosystems and the variety of potato. Thus, white potatoes are cultivated in practically all the zones of the island, whereas coloured potatoes or *bonitas* are limited to more specific zones due to their agroecological characteristics.

South of the island:

In the south of Tenerife, potatoes are grown mainly in the following areas:

■ **Middle and high altitudes of Granadilla, San Miguel, Arico, Fasnia and more isolated areas of the rest of the southern municipalities.** There are mainly white potatoes such as Cara, Red Cara, Valor, etc., although in some areas coloured potatoes are grown, mainly Negras and Palmeras.

The crop is grown in *jable* or gravel and sand of volcanic origin, which is transported from other areas and creates the appearance of large flowerpots around the plants. The planting frames are very variable, being narrower in the Abona area and wider in Fasnia and El Escobonal zones. It is an irrigated crop with early planting dates. Depending on the area, potatoes can be planted between late November and January, although in recent years there has been a tendency to plant on increasingly later dates. There is also the *Agostera* (August) potato

named after its planting date, similar to planting dates in Vilaflor. At this time, in addition to white varieties such as Cara, Red Cara and King Edward, local varieties with a short growing period are also planted, allowing them to be planted up to twice a year, such as Negras and Palmeras. Today most of these crops are mechanized, using locally designed planters and harvesters.

PHOTO8: Jable cultivation in San Miguel

PHOTO9: Jable cultivation in Vilaflor

■ **Vilaflor:** This is *par excellence* the highest cultivation area of the island, and probably of all Spain, as the crops are grown at 1,600 metres above sea level. Cultivation is very similar to that in lower zones, except for the following factors. Firstly, planting dates are later, usually between July 15 and August 15, depending on the altitude and location. Secondly, commercial white potato seed of second multiplication is used, that is, the farmers do not buy the seed but must obtain it from the

earlier harvests at low altitudes or in the northern part of the island. Thirdly, the cultivation techniques are somewhat different from those of the rest of the south, mainly because they use one of the narrowest planting frames on the islands. The harvest, depending on the year, takes place between December and January, competing with imported potatoes for a niche in the market, though having the added value of being a fresh, recently harvested product of unmistakable quality. In Vilaflor, many farmers have commented to the author of this text the existence in the past of the cultivation of ancient potatoes, of which today only the Negra variety is grown.

North of the island:

In the north, the multitude of agrosystems that exist makes it difficult to summarise them. Indeed, it is very complicated to include and review them all, but broadly speaking they can be divided as follows:

- **Anaga:** This is one of the areas of the island with the greatest agricultural biodiversity. Here potatoes are planted in March or even later, depending on the variety and location of the crop. Typical varieties are Moras, Borrallas and Palmeras, as well as certain commercial varieties, although the latter on a smaller scale. They are grown in small plots on very steep terrain, where cultivation techniques are artisanal and traditional, and normally without irrigation support.

- **Northern periurban area of Santa Cruz-La Laguna:** This is a very large area, with a multitude of potato varieties and agrosystems. The area between La Esperanza and El Sauzal is an important reserve of ancient varieties, and probably where we find the largest range: from the Negra Yema de Huevo, through the Bonitas, Azucenas, Terrentas, Coloradas de baga, etc. This is due to having an intermediate rainfed agroecology, which allows the cultivation of almost all varieties. The same is true for the traditional commercial varieties, such as Up to date, King Edward, Kerr's Pink, etc. Cultivation techniques are very traditional, although the first farms are beginning to mechanize.

■ **From the north of El Sauzal to Santa Ursula:** The cultivation in this region is mainly associated with the cultivation of chestnut trees. Thus, potatoes are planted with similar characteristics to those of La Esperanza and Tacoronte, but with the particularity that the plots are surrounded by chestnut trees, so that the management of the crop has to take into account the shade produced by the trees, so that the varieties used in the shadier areas are different than in the sunny ones. Planting dates vary between January and February, although depending on the variety, they can be planted late or sometimes early. What is striking about this area is the beautiful landscape generated by the chestnut trees in association with potatoes and other garden crops such as millet.

■ **Orotava Valley:** The Orotava Valley can be divided into four subzones:

○ **The eastern slope of the Valley**, with Mamio, Pinolere and Aguamansa, form a landscape very similar to that of Tacoronte-Acentejo, where a multitude of ancient varieties are cultivated, but mainly Bonitas, Coloradas de Baga, Pelucas, Azucenas, and other commercial varieties, all of them associated with the cultivation of chestnut trees. This agricultural landscape is of enormous environmental interest, and in areas such as Mamio there are some of the most beautiful agricultural systems in Tenerife. The cultivation is mostly rainfed.

PHOTO10: Association between the chestnut tree and the potato in La Matanza

PHOTO11: Orchard with chestnut tree prepared to sow potatoes

○ **The Central zone:** This is where the largest potato-producing areas around Benijos, Palo Blanco and Las Llanadas are located. Perhaps it is, together with Icod el Alto, the most important area in terms of quantity in the production of ancient potato varieties . Mainly the Bonitas group is cultivated, followed by the Coloradas and Venezolanas. In this area, the farmers live mainly from potato cultivation, where traditional varieties coexist with large extensions of commercial potatoes, mainly Cara and Red Cara, although in recent years new varieties such as Druid, Valor, Slaney, Rooster, etc. have appeared.

○ **The lower middle part of the Valley:** This is between 300 and 500 metres above sea level and is mainly dedicated to irrigated commercial varieties.

○ Finally, on **the western slope,** the Tigaiga area stands out in the municipality of Los Realejos, with early plantations mainly of irrigated commercial potatoes, although sometimes traditional and ancient varieties of potatoes are planted.

■ **From Icod el Alto to La Guancha:** El Teide majestically presides in this agricultural region the cultivation of potatoes in rotation with cereals and grains, mainly lupin seeds. It is one of the best areas for ancient potatoes, both for the antiquity in the cultivation (Bandini, 1816) as well as for the quality of the potatoes cultivated here. The main varieties are Bonitas, Azucenas, Coloradas, Venezolanas, and occasionally others such as Del Riñón or De María. Traditionally, the highlands have been producers of seed for the rest of the potato-growing regions of the island, where farmers from other regions go to buy seed. It is a landscape is somewhat reminiscent of the Andean producing areas. Planting is generally from January to February, and sometimes late plantings are made after the summer.

PHOTO12: Cultivation areas in Icod el Alto

PHOTO13: Potato and cereal cultivation in Icod el Alto

PHOTO14: Selecting potatoes for seed

PHOTO15: Harvesting potatoes

■ **From Icod de los Vinos to El Tanque:** Here we find an enormous varietal richness, in Las Abiertas, La Vega, San José de los Llanos, La Juncia, El Tanque, etc. These are well delimited areas, where potatoes are planted in small plots according to almost artisan cultivation systems, where the same ancient varieties as in the previous zone are mixed with more recently introduced varieties of South American origin, mainly Venezuelan, which have been brought by returning emigrants. In this zone, the form of cultivation and planting dates vary greatly, as it covers many altitudes, with many agro-ecological niches. The part of the municipality of Santiago del Teide dedicated to the cultivation of potatoes is also of some importance.

■ **Teno:** As the other rural park of Tenerife, it hosts an enormous varietal wealth. The cultivation of the Pelucas (wigs) of all colours abounds and of course the Melonera. El Palmar is famous for its Azucenas Negras (black lilies), which farmers say are the best on the island.

PHOTO16: Terrace cultivation in the north of Tenerife

■ **Other scattered areas:** There are several isolated sites where potatoes are grown in Tenerife, and it would be very difficult to list them all. But we could almost say that each municipality of Tenerife has its own potato tradition. For example, the importance of municipalities such as Tegueste and the district of Tejina in the production of potatoes Montañeras (Borrallas), which are brought from the mountains of Anaga from time to time due to the degeneration that the seed suffers at low altitudes.

THE POTATO VARIETIES OF TENERIFE.

Types and Distribution of potatoes in Tenerife.

Potatoes in Tenerife have been inventoried in several works, but there is no doubt that the most complete is the one presented by Álvarez and Gil (1996) and Gil (1997), The following groups based on their work are presented here and to which some comments have been added:

A. Potatoes corresponding to local varieties whose age is unknown and which have traditionally been cultivated in Tenerife.

In this group are the potatoes that arrived at the earliest times to the islands and are grouped in principle by their morphological characteristics:

1. Papas Torrenta, Terrenta or Sietecueros: They are planted in strips of land at mid-altitudes in the north of the island. However, this variety is in serious risk of disappearing as it is an ancient potato and produces tubers very close to the branch.

2. Papas Azucenas: It is a potato sowed along all the northern fringes of the island of Tenerife. It is also cultivated with certain importance in the northwest of the island. There are two types of Azucenas: Black and White.

3. Papas Bonitas: There are numerous forms of potatoes identified by the name of Bonitas. They are often grown all together, although there are important variations among them in production, according to the year. They are mainly cultivated at medium altitudes in the North (between 500 and 1000 m.a.s.l.) They are divided into varieties such as Bonita Llagada, Bonita Ojo de Perdiz, Bonita Blanca, Bonita Colorada and Bonita Negra. Some are also known as Marruecas or Marruecos. In the area of Aguamansa, the Bonita Blanca is known as the Boba.

PHOTO17: Variety of colors and shapes in the ancient potatoes of Tenerife

Here it is necessary to comment that the generic name "Bonitas" is used in most of north Tenerife to include ancient cultivars. This can generate some confusion in the periurban area where the term "de Color" is more commonly used.

4. Papas Coloradas, Coloradas de Baga, de Baga or Londreras: These may be the potatoes that are most widely distributed on Tenerife. They are cultivated in all zones and in some highland areas in the south of the Island.

5. Papas Negras, Negras Yema de Huevo or Negras Herreñas: They are produced at mid-altitudes in the north and in the south of Tenerife. They are potatoes with yellow flesh, very appreciated for their flavour and consistency. These potatoes belong to the *Solanum chaucha* species.

6. Papas Borrallas, Meloneras or Montañeras: Most of the production of these varieties takes place in the mountains of the northeast of the island of Tenerife, and to a lesser extent in lower areas of the bordering regions. They are also cultivated in other high areas in the north and especially in the northwest of the island.

7. Papas Moras o Brasileñas o Grasileñas: Their cultivation is limited to the mountains of the northeast of Tenerife, though they are also found in a limited way in other nearby locations.

For Ríos (2002), these last two groups (Borrallas and Moras) can be included by their morphology as ancient varieties of the subspecies *Solanum tuberosum ssp. tuberosum*, while the rest, except for the Negra Yema de Huevo (*Solanum chaucha*), belong to the *ssp. andigena*.

8. Papas Palmeras: These potatoes are cultivated in smaller or greater abundance on the whole island of Tenerife, as much on the northern slopes as on the southern ones. There are numerous types of Palmeras, and it is worth mentioning the black, coloured, veined, white ones, etc. According to existing references, they could have been introduced in the Canary Islands during the 19th century.

9. Papas Del Riñón, Riñoneras o De María: They are produced in small quantities in different areas of the island of Tenerife. There are two varieties of these potatoes: white and yellow.

10. Papas Pelucas: They are cultivated in almost all northern zones at mid- altitude on Tenerife. Three types are distinguished, these are the white, coloured and black Pelucas.

B. Potatoes introduced during the twentieth century, probably from the United Kingdom. Their seed has not been imported for many years and is preserved only by the work of the farmers themselves.

Among them we must mention the Liria or Lila, Rafaela or Marcela, Matancera and Rosita.

C. Potatoes brought by returning emigrants

These are potatoes that arrived from Venezuela and other South American countries during the 20th century, and they can even be found today in some markets in their countries of origin. There are many types, and they are commonly denominated as Venezuelans, Andeans, Colombians or Caraqueñas.

D. Recently imported potatoes (continued to the present)

These are varieties whose seed is produced in the United Kingdom. Farmers need to acquire new seed each season to produce them in his fields. The cited authors consider two groups:

1. Traditional imported varieties

These include varieties with very good organoleptic characteristics such as King Edward (called *Quinegua* or *Chinegua* depending on the area), Up to Date (called *Autodate*) and Kerr's Pink (called *Rosada*).

2. Recently introduced varieties with high yields.

These include the varieties Cara, Red Cara, Avondale, Valor, Druid, Slaney and Rooster. It is important to note that the latter variety is of excellent culinary quality, with very yellow flesh, although with low yields. It is sometimes grown by farmers for their own consumption.

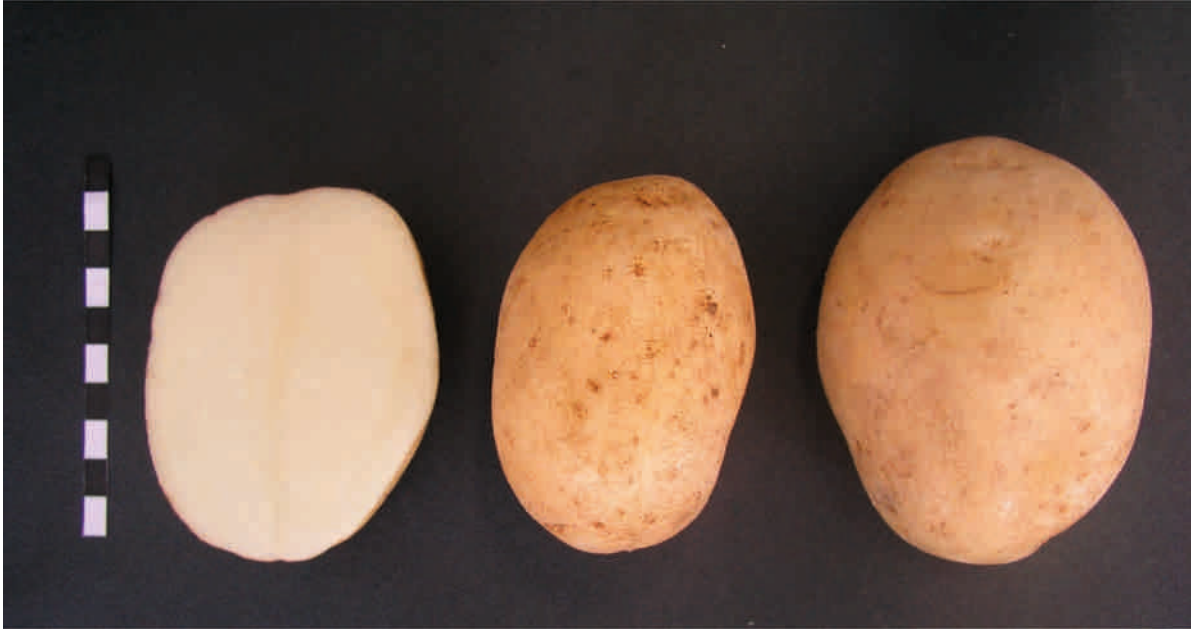

PHOTO18: Commercial variety Valor

Brief description of the main varieties

According to the different characterization works carried out so far, and as our main objective is to disseminate information on Canary Island potatoes among consumers, marketers and gourmets, we will describe the main ancient varieties of Tenerife potatoes below (Rodríguez, 2000; Gil et al, 2000; Ríos, 2002).

AZUCENA NEGRA (Black Lily)

Potatoes of this variety are generally round, with somewhat rough skin. The skin is reddish-purple, with light brown splashes as a secondary colour throughout the tuber. The flesh is cream coloured, with shallow eyes and violet sprouts or "*grelos*" with white spots. It is a very hard potato, which can last more than 4 months without sprouting or "*grelarse*". They are good to eat until January or February of the following year if harvested in June-July. This potato has always been a favourite and is included in many dishes in areas of north Tenerife.

PHOTO19: Azucena Negra

PRODUCTION ZONE: from La Esperanza to Buenavista, in particular El Palmar

TIME OF PRODUCTION: Sowing from December to January. Harvesting from June to July

PHOTO20: Azucena Blanca

AZUCENA BLANCA (White Lily)

The potatoes are predominantly round, light brown in colour, and dotted with reddish purple spots. The skin is not as rough as in the Azucena Negra. There are many potatoes with intermediate colorations between the white and black varieties, and we have even found potatoes that have a light tan skin, without splashes of reddish purple. The flesh is cream coloured like the Azucena Negra, though reversing the sprout colours, which in this case are white with splashes of violet. As for the time it takes to start sprouting, it is similar to that of its black counterpart and is a potato that can be stored for long periods.

PRODUCTION ZONE: from La Esperanza to Buenavista

TIME OF PRODUCTION: Sowing from December to January. Harvesting from June to July

BONITA BLANCA (Pretty White)

Bonita Blanca or Marrueca potatoes are light tan with very few light reddish-purple spots, mainly on the top of the tuber, eyes and eyebrows. The texture of the skin is intermediate, i.e., neither too rough nor too smooth. The flesh is light yellow. The eyes are shallow, and their shape is predominantly round, although sometimes there are compressed tubers, and even somewhat oblong ones. The sprouts are purple with a white tip. This potato lasts about four months without sprouting, somewhat less than the Azucenas, but generally good conservation.

PHOTO21: Bonita Blanca

PRODUCTION ZONE: Mainly the Orotava Valley and the Medianías from Icod el Alto to La Guancha.

TIME OF PRODUCTION: Sowing somewhat later than the lily and harvesting similar

PHOTO22: Bonita Negra

BONITA NEGRA (Pretty Black)

Bonita Negra potatoes are probably the most attractive of all the Tenerife potatoes. The skin of the tubers is a very dark reddish-purple and when washed it becomes shiny, generally presenting no secondary colours. The flesh is light yellow. The shape is usually round, somewhat compressed, although this variety can produce many tubers of elongated shape in the shape of a kite. The eyes are not very deep, and the sprouts are pale violet with white tips. The time to sprouting or shelf life is similar to the Bonita Blanca.

PRODUCTION ZONE: Mainly the Orotava Valley and the Medianías from Icod el Alto to La Guancha.

TIME OF PRODUCTION: Sowing somewhat later than the lily and harvesting similar.

BONITA COLORADA (Pretty Coloured)

These potatoes are predominantly round, somewhat compressed or irregular in shape, with pale cream coloured flesh, shallow to medium deep eyes, and purple sprouts with light whitish highlights. The tuber skin is reddish-purple, with more intensely coloured eyes and eyebrows, and a secondary colour lightly splashed with orange or brown. This variety is easily confused with the Colorada de Baga.

PHOTO23: Bonita Colorada

PRODUCTION ZONE: Mainly the Orotava Valley and the Medianías from Icod el Alto to La Guancha.

TIME OF PRODUCTION: Sowing somewhat later than the lily and harvesting similar.

PHOTO24: Bonita Ojo de Perdiz

BONITA OJO DE PERDIZ

(Pretty Bird's Eye)

These potatoes are round, somewhat compressed, sometimes having an oblong shape, and in general the eyes are not very deep. The sprouts are purple ending in white. The skin of the tuber is light cinnamon, with reddish purple spots on the eyebrows or slightly splashed, although there is a highly splashed variety that farmers call *Llagadas*. The flesh is light yellow. For many farmers the terms Llagada and Ojo de Perdiz are synonymous. However, in potato-growing areas such as La Guancha, San Juan de la Rambla and Icod el Alto, the Bonita Llagada is differentiated from the Bonita Ojo de Perdiz.

PRODUCTION ZONE: Mainly the Orotava Valley and the Medianías from Icod el Alto to La Guancha.

TIME OF PRODUCTION: Sowing somewhat later than the lily and harvesting similar.

BORRALLA O MELONERA

The tubers of this variety are oblong when viewed in one position and flat when viewed from the other, though rounder when the potatoes are small. The eyes are not very deep, with yellow flesh and the sprouts are pink with few spots along the length and at the tip. The skin colour is light brown with light orange tones, and lightly splashed with pink, especially in the eye area. It is a potato with a long period before sprouting, and with high dry matter content, so they say that when eaten with a meat stew or in *salmorejo* (tomato sauce) it "sucks" all the sauce.

PHOTO25: Boralla or Melonera

PRODUCTION ZONE: The mountains of Anaga and Teno. From here the seeds are taken for production in other areas.

TIME OF PRODUCTION: Sowings from February to March. Harvesting from June to July.

PHOTO26: Colorada de Baga

COLORADA DE BAGA (Coloured Baga)

The skin of the potato is pale reddish-purple, with splashes of brown, and smooth to the touch. The shape of the tuber is predominantly round, although many times there are potatoes with oblong shapes, and above all there are slight protuberances between the eyes, which is known as slightly tuberous shape. The flesh is cream coloured. Sprouting take time, and sprouts are violet, and the tips are white. It is a potato that lasts long after being harvested and has a high dry matter content, so that farmers say that when it is ready to be replanted is when it is best to eat. That is to say, it can last from the harvest in June until January of the following year without any problems to be consumed if its conservation conditions are moderately good.

PRODUCTION ZONE: Is one of the most widely distributed potatoes throughout the island, even being planted in some areas of the south.

TIME OF PRODUCTION: Sowings from January to February. Harvesting in June.

NEGRA YEMA DE HUEVO (Black Egg Yolk).

The most important characteristic of potatoes of this variety is the intense yellow colour inside, which makes them very attractive. The skin is very dark reddish purple, almost black, with orange-brown spots. A high variability has been found in the number of spots and their distribution. Thus, for example, in CULTESA's Negra Oro (Black gold) variety (a sanitized egg yolk black variety, i.e., devoid of viruses), the orange colour with reddish-purple spots predominates, which also tends to occur spontaneously in the field. Some growers call the lighter-coloured potatoes, which appear at harvest as Black Whites, and this seems to depend on the stress conditions to which the crop has been subjected. The eyes are not very deep, although as the tubers enlarge the eyes are much deeper. The shape of the small potatoes is round, oval in intermediate size ones and even elongated in those of large size. The sprouts are violet with white tips. These Black Potatoes are a delicacy and a rarity left to us by the farmers of Tenerife. With a creamy touch when cooked, they are not as floury as the rest of the ancient varieties. Their great disadvantage is their short time before sprouting (between 15 and 45 days), which makes them a product of great demand, as they spoil quickly after harvesting.

PHOTO27: Negra Yema de Huevo

PRODUCTION ZONE: Preferably grown in the north from Rosario to Acentejo, and in the south in the Güimar Valley to Arona.

TIME OF PRODUCTION: Sowings throughout the year, being a potato of 4 months of cultivation duration

PHOTO28: Peluca Blanca

PELUCA BLANCA (White Wig)

Thes tubers are pink, dotted with orange and brown spots. Sometimes there are variants with bluish colours. The colour of the flesh is cream, and in some we can find pink or purplish rings. The shape is flattened oblong, with the eyes of the upper part of the tuber somewhat tilted. The sprouts are purple with white tips. The eyes are shallow. It is a potato that shrivels after about 90 days, so care must be taken with its conservation. For many years, it has been the most valued potato for the consumption of those suffering from diabetes since it has a low sugar content.

PRODUCTION ZONE: From La Esperanza to Buenavista

TIME OF PRODUCTION: Sowing from December to January. Harvesting from June to July

PELUCA NEGRA (Black wig).

This is similar to the previous one, since it belongs to the same group. It varies mainly in the colour of the skin, which is very dark reddish purple with very few orange spots. The sprouts are dark purple with white tips.

PHOTO29: Peluca Negra

PRODUCTION ZONE: Mainly in the Teno Rural Park although it is also cultivated in most of the north of the island.

TIME OF PRODUCTION: Sown for summer and winter harvesting

PHOTO30: Torrenta o Terrenta

TORRENTA OR TERRENTA.

These potatoes take quite a long time to sprout. The skin is somewhat reddish purple with a dark purple secondary colour, not very deep eyes and light-yellow flesh. The sprouts are violet on a greenish-white background. They are usually small, round or oval potatoes. Occasionally, Torrentas can be found with slightly white eyes.

PRODUCTION ZONE: It is located between El Rosario and Acentejo.

TIME OF PRODUCTION: Sowing from December to January. Harvesting from June to July

VENEZUELAN NEGRA

(Black Venezuelan)

These are round, reddish-purple tubers all over with a slight brown splash, or like glasses around the eyes of the potato. The skin is soft to the touch, a fact that can sometimes serve to differentiate it from the Azucenas Negras. The eyes are shallow, with white sprouts, with a few violet spots along the eyes. It is a recently introduced potato, probably from the producing area of Mérida in Venezuela. It is highly valued for its great rusticity during cultivation, its good productivity and because it does not fall apart when cooked. It is widely used to make the famous Canarian dish of potatoes with ribs.

Photo31: Venezolana Negra

PRODUCTION ZONE: Mainly in the Teno Rural Park although it is also cultivated in most of the north of the island.

TIME OF PRODUCTION: Sowing from December to January. Harvesting from June to July

Other varieties preserved by farmers of greater or lesser antiquity.

PHOTO32: PALMERA NEGRA
(Cultivated in Tenerife. In La Palma it is known as Negra or Marciala Negra.)

PHOTO33: PALMERA BLANCA
(Cultivated in Tenerife. In La Palma it is known as Buena Moza, Marciala Blanca or Foreigner.)

PHOTO34: PALMERA COLORADA
(Cultivated in Tenerife. In La Palma it is known as Colored or Marciala.)

PHOTO35: BORRALLA COLORADA

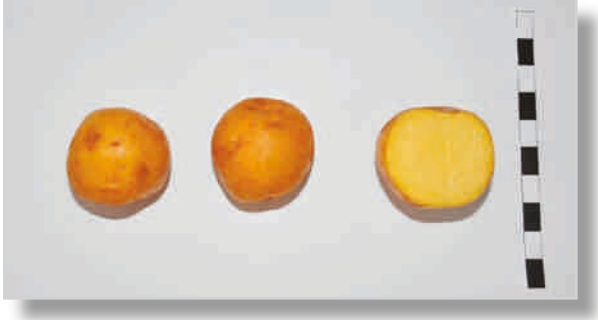

PHOTO36: POTATO DE MARÍA

PHOTO37: LIRIA

PHOTO39: POTATO DEL RIÑON

PHOTO38: RAFAELA

PHOTO40: BORREGA

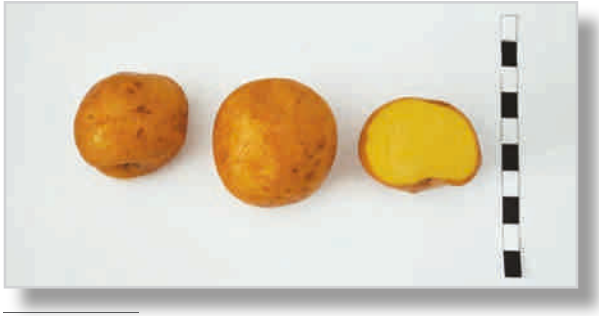

PHOTO41: COLOMBIANA

PHOTO42: POTATO DE EVARISTO (Cultivated in Lanzarote)

PHOTO43: NEGRITA
(Cultivated in El Hierro and similar to the Torrenta or Terrenta grown in Tenerife)

TIPS FOR STORING POTATOES.

The best way is to keep potatoes is in a cool place with enough humidity and in the dark. The light turns potatoes green and increases their solanine content, a substance that deteriorates their taste making them somewhat bitter and unsuitable for consumption. There is no doubt that temperatures between 6 and 8 ºC are ideal, but the place must also be well ventilated and free of other vegetables.

Special care is required for varieties such as Negras Yema de Huevo, Las Palmeras and Pelucas, as they tend to turn brown earlier, and are therefore more likely to spoil or rot.

"The Ancient Potatoes of Tenerife are a legacy from farmers for future generations that we, the people of Tenerife, must not lose. It is important to know them, to value them, to appreciate their great attributes and, finally, to consume them."

ACKNOWLEDGMENTS

First of all, I would like to thank my family for the support they have given me over the years, which I have taken time away from to dedicate to this work. And especially to my mother Isabel Mesa Herrera, my wife Luisa Roda García and my children Carlos and Luis Ríos Roda.

This book would not have been possible without all the information that many farmers on the island of Tenerife have given me throughout my professional life, many of whom are no longer with us. They have been and still are the true preservers of the traditional potatoes of Tenerife.

I would also like to thank the support provided by the National Institute of Agricultural and Agri-Food Research and Technology (INIA), which has contributed during these years with projects RTA2008-00045-C02-00 and RFP2008-00014-00-00

Finally, I would like to thank all my colleagues at the Center for Conservation of Agricultural Biodiversity of Tenerife (CCBAT)and the rest of the Technical Service of Agriculture and Rural Development of Cabildo Insular de Tenerife, and especially the Agricultural Extension Agents and Specialist Agents.

REFERENCES.-

ÁLVAREZ C.E., GIL J., 1996. Inventario de las papas presentes en la Isla de Tenerife y de los nombres que en ella reciben. Hojas Divulgativas nº 5. Servicio de Agricultura, Cabildo Insular de Tenerife. 33 pp.

BANDINI J.B., 1816. Lecciones elementales de agricultura teórica, práctica y económica. Tomo I. Imprenta Bazzanti, San Cristobal de La Laguna.

BURTON W.G., 1989. The Potato. 3ª Ed. Longman Scientific and Technical. 742 pp.

CASAÑAS R., GONZALEZ M., RODRIGUEZ E., MARRERO A., DÍAZ C., 2002. Chemometric Studies of Chemical Compounds in Five Cultivars of Potatoes from Tenerife. J. Agric. Food Chem. 50, 2076-2082.

DOYLE E., 1797. Tratado sobre el cultivo, uso y utilidades de las patatas o papas. Imprenta Real. Madrid. 2ª Edición del texto de 1785.

GIL J., 1997. El cultivo tradicional de la papa en la isla de Tenerife. Ed. Asociación Granate. La Laguna. 160 pp.

GIL J., RODRÍGUEZ C., HERNÁNDEZ E., 2000. Caracterización morfológica básica de las papas antiguas de Tenerife. Ed. Asociación Granate. La Laguna.

GRAVOUEILLE J. M., 1999. Utilización en la alimentación humana. En: La papata. Rousselle P., Robert Y., Crosnier J. C. (coordinadores). Ediciones Mundi-Prensa. Madrid. 603 pp.

HAWKES J.G., 1990. The Potato: Evolution, Biodiversity and Genetic Resources. Belhaven Press, Londres. 259 pp.

HAWKES J.G., FRANCISCO-ORTEGA J., 1992. The potato in Spain during the late 16th Century. Economic Botany 46(1):86-97.

HAWKES J.G., FRANCISCO-ORTEGA J., 1993. The early history of the potato in Europe. Euphytica 70, 1-7.

HARLAN J.R., 1992. Crops and Man, 2nd ed. American Society and Agronomy, and Crop Science Society of America. Madison. Estados Unidos.

HUAMAN Z., SPOONER D.M., 2002. Reclassification of landrace populations of cultivated potatoes (Solanum sect. Petota). Americal Journal of Botany 89 .

LOBO CABRERA M., 1988. El comercio canario europeo bajo Felipe II. Viceconsejería de Cultura y Deportes de el Gobierno de Canarias y Secretaría Regional de Turismo, Cultura e Emigraçao de Governo Regional da Madeira. Funchal.

OCHOA C.M., 1999. Las Papas de Sudamérica. Perú. I parte. Centro Internacional de la Papa. 1036 pp.

RÉGULO PÉREZ J., 1973. El cultivo de las papas en Canarias. El día, 9 de junio de 1973. pp 10-17.

RÍOS MESA D., GALVÁN RODRÍGUEZ C., GIL GONZÁLEZ J., GONZÁLEZ RODRÍGUEZ P., PERDOMO MOLINA A.,SUÁREZ ENCINOSO T., 1999. Propuesta de Reglamento de la Denominación de Origen Papas Antiguas de Canarias. Asociación Canaria de Papa de Color. 77 pp. Sin publicar.

RÍOS MESA D., 2002. Caracterización morfológica y ecofisiológica de un grupo de cultivares locales de papas de Tenerife. Universidad de Santiago de Compostela. Tesis doctoral. 373 pp. Sin publicar.

RODRÍGUEZ LÓPEZ C., 2000. Características morfológicas de catorce variedades tradicionales de papa existentes en la isla de Tenerife. Trabajo Final de Carrera. Centro Superior de Ciencias Agrarias. Universidad de La Laguna. Sin publicar.

UGENT D., 1970. The Potato. Science 179, 1161-1166.

VIERA Y CLAVIJO J., 1866. Diccionario de Historia Natural de las Islas Canarias. Excma. Mancomunidad de Cabildos de Las Palmas. (Edición de 1982). Las Palmas de Gran Canaria.

ZUBELDIA LIZARDUY A., LÓPEZ-CAMPOS G., SAÑUDO-PALAZUELOS A., 1955. Estudio, descripción y clasificación de un grupo de variedades primitivas de patata cultivadas en las Islas Canarias. Instituto Nacional de Investigaciones Agronómicas. Vol. XV. Cuaderno 225; 33, 287-324.