Bioversity International

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Descriptors for

Quinoa

and wild relatives

Quinua 2013 Año Internacional Un futuro sembrado hace miles de años

aecid

Fundación PROINPA

INIAF Instituto Nacional de Innovación Agropecuaria y Forestal

IFAD

Enabling poor rural people to overcome poverty

List of Descriptors

Allium (E/S)	2000
Almond (Revised)* (E)	1985
Apple* (E)	1982
Apricot* (E)	1984
Avocado (E/ S)	1995
Bambara groundnut (E/F)	2000
Banana (E/S/F)	1996
Barley (E)	1994
Beta (E)	1991
Black pepper (E/S)	1995
Brassica and *Raphanus* (E)	1990
Brassica campestris L. (E)	1987
Buckwheat (E)	1994
*Capsicum** (E/S)	1995
Cardamom (E)	1994
Carrot (E/S/F)	1999
Cashew* (E)	1986
Chenopodium pallidicaule (S)	2005
Cherimoya (E/S)	2008
Cherry* (E)	1985
Chickpea (E)	1993
Citrus (E/F/S)	1999
Coconut (E)	1992
Coffee (E/S/F)	1996
Cotton (Revised)* (E)	1985
Cowpea* (E)	1983
Cultivated potato* (E)	1977
Date palm (F)	2005
Durian (E)	2007
Echinochloa millet* (E)	1983
Eggplant (E/F)	1990
Faba bean* (E)	1985
Fig (E)	2003
Finger millet* (E)	1985
Forage grass* (E)	1985
Forage legumes* (E)	1984
Grapevine (E/S/F)	1997
Groundnut (E/S/F)	1992
Hazelnut (E)	2008
Jackfruit (E)	2000
Kodo millet* (E)	1983
Lathyrus spp. (E)	2000
Lentil* (E)	1985
Lima bean* (E/P)	2005
Litchi (E)	2002
Lupin* (E/S)	1981
Maize (E/S/F/P)	1991
Mango (Revised) (E)	2006
Mangosteen (E)	2003
Medicago (Annual)* (E/F)	1991
Melon (E)	2003
Mung bean* (E)	1980
Oat* (E)	1985
Oca* (S)	2001
Oil palm (E)	1989
Panicum miliaceum and *P. sumatrense* (E)	1985
Papaya (E)	1988
Peach* (E)	1985
Pear* (E)	1983
Pearl millet (E/F)	1993
Pepino (E)	2004
Phaseolus acutifolius (E)	1985
*Phaseolus coccineus** (E)	1983
*Phaseolus vulgaris** (E/P)	1982
Pigeonpea (E)	1993
Pineapple (E)	1991
Pistacia (excluding *P. vera*) (E)	1998
Pistachio (E/F/A/R)	1997
Plum* (E)	1985
Potato varieties* (E)	1985
Quinoa* (S/E/F)	2013
Rambutan (E)	2003
Rice* (E/P)	2007
Rocket (E/I)	1999
Rye and Triticale* (E)	1985
Safflower* (E)	1983
Sesame* (E)	2004
Setaria italica and *S. pumila* (E)	1985
Shea tree (E)	2006
Sorghum (E/F)	1993
Soyabean* (E/C)	1984
Strawberry (E)	1986
Sunflower* (E)	1985
Sweet potato (E/S/F)	1991
Taro (E/F/S)	1999
Tea (E/S/F)	1997
Tree tomato (E)	2013
Tomato (E/S/F)	1996
Tropical fruit* (E)	1980
Ulluco (S)	2003
Vigna aconitifolia and *V. trilobata* (E)	1985
Vigna mungo and *V. radiata* (Rev.)* (E)	1985
Walnut (E)	1994
Wheat (Revised)* (E)	1985
Wheat and *Aegilops** (E)	1978
White clover (E)	1992
Winged bean* (E)	1979
*Xanthosoma** (E)	1989
Yam (E/S/F)	1997

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Descriptors for

Quinoa

and wild relatives

Bioversity International is a research-for-development organization working with partners worldwide to use and conserve agricultural and forest biodiversity for improved livelihoods, nutrition, sustainability, and productive and resilient ecosystems. Bioversity International is a member of the CGIAR Consortium, a global research partnership for a food secure future. www.bioversityinternational.org.

PROINPA Foundation mission is to promote innovation in farming families, local emerging entrepreneurs and agribusiness firms through technology development for agroecological crop management, agricultural biodiversity sustainable management, development of agribusinesses impact-oriented and service delivery, production and marketing of fresh and derivative Andrean products. PROINPA activities have positive effects on food security, poverty reduction, employment and income generation and effectiveness of its group working through alliances, capacity building, transparency, adaptation to climate change effects, environmental efficiency and sustainability.

INIAF is the competent guiding authority of the Agricultural and Forestry Innovation System (SNIAF), aiming at creating technologies, establishing frameworks and managing public agricultural and forestry innovation policies, in order to contribute to food sovereignty and security, within the context of dialogue knowledge, social participation and genetic resources management of agricultural biodiversity as State patrimony.

Achieving food security for all to make sure people have regular access to enough high-quality food to lead active, healthy lives is at the heart of the **Food and Agriculture Organization of the United Nations (FAO)**'s effort. FAO's mandate is to improve nutrition, increase agricultural productivity, raise the standard of living in rural populations and contribute to global economic growth. FAO's mission aims to contribute to the creation for present and future genrations of a world in which food security reigns, through: reduction of food insecurity and rural poverty, a regulatory framework, sustainable growth and food availability, natural resources conservation and knowledge generation.

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Bioversity International
Headquarters
Via dei Tre Denari 472/a
00057 Maccarese (Fiumicino)
Rome, Italy

FAO
Regional Office for Latin America
and the Caribbean
Av. Dag Hammarskjold 3241
Vitacura
Santiago de Chile

INIAF
Calle Batallon Colorados Nº 24,
Edif. El Cóndor Piso 12
4793
La Paz, Bolivia

IFAD
Via Paolo di Dono, 44
00142
Rome, Italy

Fundación PROINPA
Américo Vespucio N° 538 – 3° Piso
Zona Sopocachi
1078
La Paz, Bolivia

CONTENTS

PREFACE

The '**Descriptors for quinoa (*Chenopodium quinoa* Willd.) and wild relatives**' is a revision of the IBPGR (now Bioversity International) original publication, entitled "Descriptores de quinua"(AGP:IBPGR/81/104) and is based on the work of a Bolivian team of experts, who identified useful phenotipic traits through the characterization and evaluation of the wide genetic variability stored whithin the Bolivian quinoa germplasm collection. This work was coordinated by Wilfredo Rojas from PROINPA and was validated in 2003 at the Regional Workshop of a project managed by the International Plant Genetic Resource Institute (IPGRI) (now called Bioversity International): "Enhancing the contribution of neglected and underutilized species to food security, and to incomes of the rural poor", sponsored by the International Fund for Agricultural Development (IFAD) in which partners from Ecuador (INIAP, UCODEP), Peru (CIRNMA, INIA-Puno, INIA-Cuzco, UNA, PIWANDES) and Bolivia (PROINPA, UMSA, UACT-UCB, CIFP) participated. A draft version prepared in the internationally accepted Bioversity format was subsequently sent to international experts for their comments and amendments. A full list of the names and addresses of those involved is given under "Contributors".

The updating process of the quinoa descriptors was financially supported by the FAO Proyecto de Semillas Andinas (GCP/RLA/183/SPA), carried out with Spanish Cooperation resources, and the FAO's Plant Production and Protection Division (AGP).

Bioversity International encourages the collecting of data for all five types of descriptors (see Definitions and Use of the Descriptors). The number of descriptors selected in each category will depend on the crop and their importance to the crop's description and utilization. Descriptors listed under *Evaluation* allow a more detailed description of the accession, but generally require repeated trials over a period of time.

Although the suggested coding should not be regarded as the definitive scheme, this format represents an important tool for a standardized characterization system and is promoted by Bioversity throughout the world. This descriptor list provides an international format and thereby produces a universally understood 'language' for plant genetic resources data. The adoption of this scheme for data encoding, or at least the production of a transformation method to convert other schemes into the Bioversity format, will produce a rapid, reliable, and efficient means for information storage, retrieval and communication, and will assist with the use of germplasm. It is recommended, therefore, that information should be produced by closely following the descriptor list with regard to ordering and numbering descriptors, using the descriptors specified and using the descriptor states recommended.

This descriptor list is intended to be comprehensive for the descriptors that it contains. This approach assists with the standardization of descriptor definitions. Bioversity does not, however, assume that curators will characterize accessions of their collection using all descriptors given. Descriptors should be used when they are useful to curators for the management and maintenance of the collection or to the users of plant genetic resources. To this end, highly discriminating descriptors are listed at the beginning of the Characterization section and are highlighted in the text to facilitate selection of descriptors.

The 'FAO/Bioversity List of Multi-Crop Passport Descriptors' (Alercia et al., MCPD V.2, 2012) was included to provide consistent coding schemes for common passport descriptors across crops. They are marked in the text as [MCPD]. Owing to the generic nature of the multicrop passport descriptors, not all descriptor states for a particular descriptor will be relevant to a specific crop.

In Annex I, the reader will find a 'Collecting form for quinoa' that will facilitate data collection.

Any suggestions for improvement of the 'Descriptors for quinoa and wild relatives' will be highly appreciated by Bioversity[1].

1 Contact: a.alercia@cgiar.org

INTRODUCTION

The Andean region, home to great civilizations such as the Tiahuanacota and the Inca, is considered the origin of many native plant species including quinoa (*Chenopodium quinoa* Willd.). For thousands of years the cultivation of quinoa was the main food of ancient Andean cultures and as a result it is distributed in different agroecological areas in the region. Nowadays, quinoa production is undergoing a process of expansion as quinoa is expected to offer great potential to improve livelihoods of the Andean and world populations.

Quinoa is a grain with intrinsic outstanding characteristics: wide **genetic variability** whose genepool is remarkably strategic to develop improved varieties (precocity, grain colour and size, resistance or tolerance to biotic and abiotic stresses, grain yield and byproducts). It adapts to desert, hot and dry climates. This crop can grow with relative humidity from 40% to 88%, and survive with temperatures from -4°C to 38°C. It is resistant to low soil moisture, and can produce acceptable yields even with precipitations from 100 to 200 mm. Due to its **ability to adapt** to adverse climate and soil conditions where other crops are unable to grow, harvest can be obtained at altitudes from sea level to 4000 m (high Andean plateau, 'salares', 'Andean plateau', inter-Andean valleys, 'yungas', sea level). Its **nutritional quality**, with a high content of rich essential aminoacids, makes it an excellent functional food for the organism. It has many different **uses**: culinary, traditional, non-traditional and in industrial innovations.

Facing the global need to identify options able to produce quality food, quinoa is a crop with great potential for both its nutritional benefits and its agronomic versatility to contribute to food security in different regions worldwide, especially in those countries where people do not have access to protein sources or where there is limited food production and consequently people need to import it or request food aid. For these countries, quinoa offers an opportunity to produce their own food. This crop is very attractive in different areas worldwide for its remarkable ability to adapt to ecologically extreme conditions.

In 1996, quinoa was catalogued by FAO as one of the most promising crops for the humanity, not only for its great properties and its multiple uses, but also because it is considered an option to solve human nutrition problems (FAO, 2011). Even NASA included quinoa in its CELSS system (Controlled Ecological Life Support Systems) to equip missions during long-term space trips as it has excellent nutritional composition, suitable for addressing inadequate protein intake. There are many quinoa derivatives such as insufflates, flour, noodles, flakes and energy bars. Additionally, manufactured products and products requiring the use of more advanced technologies are under development, such as extraction of quinoa oil , starch, saponin, protein concentrates, quinoa milk, and also, leaf and seed dye extraction.

These products are considered to offer great economic potential for quinoa as they regard not only the nutritional characteristics but also the physico-chemical ones that go beyond food industry products to the chemical, pharmaceutical and cosmetic industries.

Different common names can be found in literature that change according to the language, site location or country. The most common names are the following:

Quechua:	Kiuna, quinua, parca
Aymara:	Supha, jopa, jupha, jauira, jiura, aara, ccallapi, vocali
Azteca:	Huatzontle
Chibcha:	Suba, supha, pasca
Mapuche:	Quinua
Spanish:	Quinua, quínoa, quingua, quiuna, kinoa, triguillo, trigo inca, arrocillo, arroz del Perú, Dahuie, juba, ubaque, ubate, juira, suba
Indian:	Bathu
Portuguese:	Arroz miúdo do Perú, espinafre do Perú, quinoa
English:	Quinoa, quinua, kinoa, sweet quinoa, Peruvian rice, Inca rice, petty rice
French:	Ansérine quinoa, riz de Pérou, petit riz de Pérou, quinoa
Italian:	Quinua, chinua
German:	Reisspinat, Peruanischer reisspinat, reismelde, Reis-gerwacks, Inkaweizen

DEFINITIONS AND USE OF THE DESCRIPTORS

Bioversity International uses the following definitions in genetic resources documentation.

Passport descriptors: These provide the basic information used for the general management of the accession (including registration at the genebank and other identification information) and describe parameters that should be observed when the accession is originally collected, including etnobotanical information.

Management descriptors: These provide the basis for the management of accessions in the genebank and assist with their multiplication and regeneration.

Environment and site descriptors: These describe the environmental and site-specific parameters that are important when characterization and evaluation trials are held. They can be important for the interpretation of the results of those trials. Site descriptors for germplasm collecting are also included here.

Characterization descriptors: These enable an easy and quick discrimination between phenotypes. They are generally highly heritable, can be easily seen by the eye and are equally expressed in all environments. In addition, these may include a limited number of additional traits thought desirable by a consensus of users of the particular crop.

Evaluation descriptors: The expression of many of the descriptors in this category will depend on the environment and, consequently, special experimental designs and techniques are needed to assess them. Their assessment may also require complex biochemical or molecular characterization methods. These types of descriptors include characters such as yield, agronomic performance, stress susceptibilities and biochemical and cytological traits. They are generally the most interesting traits in crop improvement.

Characterization will normally be the responsibility of genebank curators, while more complete evaluation, which often needs to schedule experiments, has to be carried out by plant breeders or other experts who will use the material. The evaluation data should be fed back to the genebank, which will maintain a data file.

Minimum descriptors to use and describe quinoa are highlighted in the text.

The following internationally accepted norms for the scoring, coding and recording of descriptor states should be followed:

(a) the Système International d'Unités (SI); the units to be applied are given in square brackets following the descriptor name;

(b) standard colour charts, e.g. Royal Horticultural Society Colour Chart, Methuen Handbook of Colour, or Munsell Color Chart for Plant Tissues, are strongly recommended for all ungraded colour characters (the precise chart used should be specified in the section where it is used);

(c) the three-letter abbreviations from the *International Standard* (ISO) *Codes for the representation of names of countries* are used;

(d) many quantitative characters, continuously variable, should be scored on a 1–9 scale, where:

1	Very low	6	Intermediate to high
2	Very low to low	7	High
3	Low	8	High to very high
4	Low to intermediate	9	Very high
5	Intermediate		

is the expression of a character. The authors of this list have sometimes described only a selection of the states, e.g. 3, 5 and 7 for such descriptors. Where this has occurred, the full range of codes is available for use by extension of the codes given or by interpolation between them, e.g. in Section 10 (Biotic stress susceptibility), 1 = very low susceptibility and 9 = very high susceptibility;

(e) when a descriptor is scored using a 1–9 scale, such as in (d), '0' would be scored when (i) the character is not expressed; (ii) a descriptor is inapplicable. In the following example, '0' will be recorded if an accession does not have leaf central lobe:

Shape of central leaf lobe

1	Oval
2	Elliptic
3	Circular

(f) absence/presence of characters is scored as follows:

0	Absent
1	Present

(g) blanks are used for information not yet available;

(h) for accessions which are not generally uniform for a descriptor (e.g. mixed collection, genetic segregation), the mean and standard deviation could be reported where the descriptor is continuous. Where the descriptor is discontinuous, several codes in the order of frequency could be recorded; or other publicized methods can be utilized, such as Rana *et al.* (1991) or van Hintum (1993), that clearly state a method for scoring heterogeneous accessions;

(i) dates should be recorded numerically as YYYYMMDD, where

YYYY	-	4 digits to represent the year
MM	-	2 digits to represent the month
DD	-	2 digits to represent the day

If the month or days are missing, this should be indicated with hyphens or '00' [double zero]. (e.g. 1975 ----, 19750000, 197506--, 19750600).

PASSPORT

All descriptors listed under Passport, belonging to the multicrop passport descriptors category, are indicated in the text as [MCPD]. Descriptors numbers belonging to the original list published in 1985, are included in parentheses next to the descriptor's name.

1. Accession descriptors

1.1 Institute code [MCPD]

FAO WIEWS code of the institute where the accession is maintained. The codes consist of the 3-letter ISO 3166 country code of the country where the institute is located, plus a number. The current set of institute codes is available from http://apps3.fao.org/wiews/wiews.jsp.

1.1.1 Institute name

Name of the Institute where the accession is maintained. This descriptor should be used if FAO WIEWS code is not available.

1.1.2 Institute address

Address of the Institute where the accession is maintained. This descriptor should be used if FAO WIEWS code is not available.

1.2 Accession number (1.1) [MCPD]

This number serves as a unique identifier for accessions within a genebank, and is assigned when a sample is entered into the genebank collection. Once assigned this number should never be reassigned to another accession in the collection. Even if an accession is lost, its assigned number should never be reused. Letters should be used before the number to identify the genebank or national system (e.g. 'PI 113869' indicates an accession within the USA system).

1.3 Donor institute code [MCPD]

FAO WIEWS code of the donor institute. (See instructions under *Institute code*, **1.1**).

1.3.1 Donor institute name

Name of the donor institute (or person). This descriptor should be used if the donor institute 'code' (see instructions under *Donor institute code*, **1.3**) is not available.

1.4 Donor accession number (1.6) [MCPD]

Identifier assigned to an accession by the donor. (See instructions under *Accession number*, **1.2**).

1.5 Other identifiers associated with the accession (1.7) [MCPD]
Any other identifiers known to exist in other collections for this accession. Institute code and identifier are separated by a colon (:) without space. Pairs of institute code and identifier are separated by a semicolon (;) without space. When the institute is not known, the identifier should be preceded by a colon.

1.6 Breeding institute code [MCPD]
FAO WIEWS code of the institute that has (genetically) bred the material. If the holding institute has bred the material, the breeding institute code should be the same as the holding institute code. (See instructions under *Institute code*, **1.1**). Multiple values are separated by a semicolon without space.

1.6.1 Breeding institute name [MCPD]
Name of the institute (or person) that bred the material. This descriptor should be used only if FAO WIEWS code is not available. Multiple names are separated by a semicolon without space.

1.7 Genus (1.2.1) [MCPD]
Genus name for taxon. Initial uppercase letter required, e.g. *Chenopodium*.

1.8 Species (1.2.2) [MCPD]
Specific epithet portion of the scientific name in lowercase letters (e.g. *quinoa*). Only the following abbreviation is allowed: 'sp.'.

1.8.1 Species authority [MCPD]
Provide the authority for the species name.

1.9 Subtaxon [MCPD]
Specify any additional taxonomic identifier. The following abbreviations are allowed: "subsp." (for subspecies); "convar." (for convariety); "var." (for variety); "f." (for form); "Group" (for "cultivar group").

1.9.1 Subtaxon authority [MCPD]
Provide the subtaxon authority at the most detailed taxonomic level.

1.10 Accession

1.10.1 Accession name [MCPD]
Either a registered or other designation given to the material received other than the *Donor accession number*, **1.4** or *Collecting number*, **2.3**. First letter uppercase. Multiple names are separated by a semicolon without space. Example: Accession name: Bogatyr;Symphony;Emma.

1.10.2 Synonyms
Include here any names other than the current one.

1.10.3 Common crop name [MCPD]
Common name of the crop. Example: 'quinoa', 'barley', 'macadamia'.

1.11 Ancestral data [MCPD]
Information about either pedigree or other description of ancestral information (i.e. parent variety in the case of mutant or selection). For example: a pedigree "Hanna/7*Atlas/Turk/8*Atlas"; or "mutation found in Hanna"; or "breeding concerning Hanna or Irene among others".

1.12 Acquisition date [YYYYMMDD] [MCPD]
Date on which the accession entered the collection where YYYY is the year, MM is the month and DD is the day. Missing data (MM or DD) should be indicated with hyphens or double zero.

1.13 Remarks
Elaborate here any additional information.

2. Collecting descriptors

2.1 Collecting mission identifier [MCPD]
Identifier of the collecting mission assigned by collecting institution or person (e.g. 'CIATFOR-052', 'CN426').

2.2 Collecting institute code [MCPD]
FAO WIEWS code of the institute(s) collecting the sample. If the holding institute has collected the material, the collecting institute code should be the same as the holding institute code. Multiple values are separated by a semicolon without space. (See instructions under *Institute code*, **1.1**).

2.2.1 Collecting institute(s) name(s) (2.1) [MCPD]
Name of the institute(s) and/or person who collected the original sample or sponsoured it. This descriptor should be used only if the collecting institute 'code' (see **2.2**) is not available.

2.2.1.1 Collecting institute(s) address(es)
Address of the institute(s) and/or person who collected the original sample or sponsoured it. This descriptor should be used only if the collecting institute 'code' (see **2.2**) is not available.

2.3 Collecting number (2.2) [MCPD]
Original identifier assigned by the collector(s) of the sample, normally composed by the name or initials of the collector(s) followed by a number (e.g. 'FM9909'). This identifier is essential for identifying duplicates held in different collections.

2.4 Collecting date of sample [YYYYMMDD] (2.3) [MCPD]
Collecting date of the sample where YYYY is the year, MM is the month and DD is the day. Missing data (MM or DD) should be indicated with hyphens or double zero.

2.5 Country of origin (2.4) [MCPD]
Three-letter ISO 3166-1 code of the country in which the sample was originally collected (landrace, crop wild relative, farmers' variety), bred or selected (breeding lines, GMOs, segregating populations, hybrids, modern cultivars, etc.).

2.6 Location of collecting site (2.8) [MCPD]
Location information below the country level that describes where the accession was collected (preferably in English). This might include the distance in kilometres and direction from the nearest town, village or map grid reference point (e.g. 7 km South of Chucuito in the department of Puno).

Geographical coordinates

➡ For latitude and longitude descriptors, two alternative formats are proposed, but the one reported by the collecting mission should be used.

➡ Latitude and longitude in decimal degree format with a precision of four decimal places corresponds to approximately 10 m at the Equator and describes the point-radius representation of the location, along with geodetic datum and coordinate uncertainty in metres.

2.7 Latitude of collecting site (decimal degrees) (2.6) [MCPD]
Latitude expressed in decimal degrees. Positive values are North of the Equator, negative values are South of the Equator (e.g. -44.6975).

2.7a Latitude of collecting site (degrees, minutes, seconds) (2.6) [MCPD]
Degrees (2 digits), minutes (2 digits) and seconds (2 digits) followed by N (North) or S (South) (e.g. 103020S). Every missing digit (minutes or seconds) should be indicated with a hyphen. Leading zeros are required (e.g. 10----S; 011530N; 4531--S).

2.8 Longitude of collecting site (decimal degrees) [MCPD]
Longitude expressed in decimal degrees. Positive values are East (E) of the Greenwich Meridian, negative values are West (W) of the Greenwich Meridian (e.g. +120.9123).

2.8a Longitude of collecting site (degrees, minutes, seconds) [MCPD]
Degrees (3 digits), minutes (2 digits) and seconds (2 digits) followed by E (East) or W (West) (e.g. 0762510W). Every missing digit (minutes or seconds) should be indicated with a hyphen. Leading zeros are required (e.g. 076----W).

2.9 Coordinate uncertainty [m] [MCPD]
Uncertainty associated with the coordinates in metres. Leave the value empty if the uncertainty is unknown.

2.10 Coordinate datum [MCPD]
The geodetic datum or spatial reference system upon which the coordinates given in decimal latitude and decimal longitude are based (e.g. WGS84, ETRS89, NAD83). The GPS uses the WGS84 datum.

2.11 Georeferencing method [MCPD]
The georeferencing method used (GPS, determined from map, gazetteer, or estimated using software). Leave the value empty if georeferencing method is not known.

2.12 Elevation of collecting site [m] (2.9) [MCPD]
Elevation (or altitude) of collecting site expressed in metres above sea level. Negative values are allowed.

2.13 Collecting /acquisition source (2.10) [MCPD]
The following code scheme proposed observes MCPD global codes (as in 10, 12, etc.).

10 Wild habitat
20 Farm or cultivated habitat
30 Market or shop
40 Institute, Experimental station, Research organization, Genebank
50 Seed company
60 Weedy, disturbed or ruderal habitat
99 Other (elaborate in descriptor **2.22 Collector remarks**)

2.13.1 Agroecological crop areas
Indicate crop areas.

1 Interandean valley
2 Highland
3 'Salares'
4 Sea level
5 'Yunga'
6 'Puna'
99 Other (elaborate in descriptor **2.22 Collector remarks**)

2.14 Biological status of accession (2.11) [MCPD]

The following codification strictly observes the main descriptor status in the MCPD List.

100 Wild
200 Weedy
300 Traditional cultivar/landrace
400 Breeding/research material
500 Advanced or improved cultivar (conventional breeding methods)
600 GMO (by genetic engineering)
999 Other (elaborate in descriptor **2.22 Collector remarks**)

2.15 Variability of population

Variability observed within the population or plot (colour, size, morphotype) where the sample was collected.

1 Uniform
3 Low variability
5 Variable
7 High variability

2.16 Collecting source environment

Use descriptors **6.1** to **6.2** in section **6**.

2.17 Number of plants sampled

2.18 Ethnobotanical data

Information on traditional attributes of the sample in place for collecting runs (community): uses, methods of preparation, native names, healing properties, cultural beliefs and other characteristics.

2.18.1 Local vernacular name

Name given by farmer to crop and cultivar/landrace/clone/wild form. Vernacular name of the sample as known in its site of origin.

2.18.2 Ethnic group

Name of the ethnic group where people living in the collecting area belong. E.g. Quechuas, Aymaras, Chipayas, others.

2.18.3 Traditional use

Information about the use of the sample (entire plant) or parts of it (seed, leaf, stem or root).

2.18.3.1 Parts of the plant used

1 Grain
2 Leaves
3 Stem
4 Root
99 Other (elaborate in descriptor **2.22 Collector remarks**)

2.18.3.2 Human food

It includes information about different ways of preparation along with their traditional names. E.g. P'iri.

1 Tender leaves (soups)
2 Cooked grain (soups, stews,'pesque', 'graneado')
3 Roasted grain
4 Roasted and milled grain ('pito de quinua')
5 Flour (bread and biscuit ('Kispiña/Tajoles'))
6 Refreshment/'Ullphu'
7 'Llipta/Llujta/Lejia'
99 Other (elaborate in descriptor **2.22 Collector remarks**)

2.18.3.3 Animal feed

Information about different uses in cattle feeding.

1 Green fodder
2 Dry fodder (hay)
3 By-threshing ('jipi, broza, quiri')
4 Flour
99 Other (elaborate in descriptor **2.22 Collector remarks**)

2.18.3.4 Medicine

Indicate in descriptor **2.22 Collector remarks**, the healing properties of the sample or parts of it (root, stem, leaves or grain), types of ailments to which it applies, preparation methods and traditional names.

1 Anaemia
2 Diarrhoea
3 Tuberculosis
4 Rheumatism
5 High altitude sickness
6 Fatigue
7 Fracture
8 Hypocalcaemia
9 Diuretic
10 Antipyretic
99 Other (elaborate in descriptor **2.22 Collector remarks**)

2.18.4 Cultural characteristics

Brief information on sample uses in traditional celebrations, rituals, ceremonies and others.

2.19 Photograph

Was a photograph(s) of the sample or habitat taken at the time of collecting? If so, provide an identification number(s) in descriptor **2.22 Collector remarks**.

0 No
1 Yes

2.19.1 Photograph identification number

2.20 Herbarium specimen

Was a herbarium specimen collected? If so, provide the identification number and indicate in which place (herbarium) the quinoa specimen was deposited.

0 No
1 Yes

2.20.1 Herbarium identification number

2.20.2 Herbarium name

2.21 Prevailing stresses

Information on main associated abiotic (frost, drought) and biotic (pests, diseases) stresses.

2.22 Collector remarks

Elaborate here any additional information recorded by the collector or any specific information on the status of the above mentioned descriptors.

MANAGEMENT

3. Management descriptors

3.1 Accession number
(See instructions in descriptor **1.2**).

3.2 Population identification
Collecting number, pedigree, cultivar name etc., depending on the population type.

3.3 Storage address
Storage location and building position, room, shelf number/location in medium-term and/or long-term storage.

3.4 **Storage date** [YYYYMMDD]

3.5 **Seed germination at storage (initial)** [%]

3.6 **Date of last seed germination test** [YYYYMMDD]

3.7 **Seed germination at the last test** [%]

3.8 **Date of next seed germination test** [YYYYMMDD]

3.9 **Seed moisture content at harvest** [%]

3.10 **Seed moisture content at storage** [%]

3.11 **Type of germplasm storage** [MCPD]
If germplasm is maintained under different types of storage, multiple choices are allowed, separated by a semicolon without space (e.g. 20;30).

- 10 Seed collection
  - 11 Short term
  - 12 Medium term
  - 13 Long term
- 20 Field collection
- 30 *In vitro* collection
- 40 Cryopreserved collection
- 50 DNA collection
- 99 Other (elaborate in **3.14 Remarks**)

3.12 Code of institute maintaining safety duplicates [MCPD]

FAO WIEWS code of the institute where a safety duplicate of the accession is maintained. Multiple values are separated by a semicolon without space. (See instructions in descriptor **1.1**).

3.12.1 Institute maintaining safety duplicates [MCPD]

Name of the institute where a safety duplicate of the accession is maintained. This descriptor should be used only if the 'code' of the institute maintaining duplicates (see descriptor **3.12**) is not available.

3.13 MLS status of the accession [MCPD]

The status of an accession with regard to the Multilateral System (MLS) of the International Treaty on Plant Genetic Resources for Food and Agriculture. Leave the value empty if the status is not known.

0 No (not included)
1 Yes (included)
99 Other (elaborate in **3.14 Remarks**, e.g. 'under development')

3.14 Remarks

Any additional information may be elaborated here.

4. Multiplication/regeneration descriptors

4.1 Accession number

(See instructions in descriptor **1.2**).

4.2 Population identification

Collecting number, pedigree, cultivar name, etc., depending on the population type.

4.3 Field plot number

4.4 Multiplication/regeneration site location

4.5 Collaborator(s) name

4.6 Sowing date [YYYYMMDD]

4.7 Cultural practices

4.7.1 Field spacing

For characterization and evaluation of quinoa germplasm purposes and to obtain the best phenotypic expression, it is recommended to sowing at 50-60 cm between rows and 30-40 cm between plants.

4.7.1.1 Distance between plants in a row [cm]

(and/or distribution under continuous jet).

4.7.1.2 Distance between rows [cm]

4.7.1.3 Fertilizer application

Specify type, doses, frequency of each one and application method.

4.8 Seed viability

4.8.1 Plant/seedling vigour

Evaluated 15 days after the sowing in the field.

3 Low
5 Intermediate
7 High

4.8.2 Number of plants established

4.9 Previous multiplication and/or regeneration

4.9.1 Location

4.9.2 Sowing date [YYYYMMDD]

4.9.3 Plot number

4.10 Number of times accession regenerated (1.4)

Since the date of acquisition.

4.11 Remarks

Any additional information may be elaborated here.

ENVIRONMENT AND SITE

5. Characterization and/or evaluation site descriptors

5.1 Country of characterization and/or evaluation
(See instructions in descriptor **2.5**).

5.2 Site of characterization and/or evaluation

5.2.1 Latitude
(See instructions in descriptor **2.7**/**2.7a**).

5.2.2 Longitude
(See instructions in descriptor **2.8**/**2.8a**).

5.2.3 Elevation [masl]
Meters above sea level.

5.3 Evaluator's name and address (3.2)

5.4 Sowing date [YYYYMMDD] (3.3)

5.5 Harvest date [YYYYMMDD] (3.4)

5.6 Evaluation environment (3.1)
Environment in which characterization/evaluation was carried out.

1 Field
2 Greenhouse
3 Laboratory
99 Other (elaborate in descriptor **5.11 Remarks**)

5.7 Sowing/planting site in the field
Give block, strip and/or row/plot number as applicable, plants/plot, replication.

5.8 Fertilizers
Specify type, doses, frequency of each one and its application method

5.9 Plant protection
Specify type of pesticide and weed-killer used, doses, frequency of each one and its application method.

5.10 Environmental characteristics of site

Use descriptors **6.1.1** to **6.2** in section **6**.

5.11 Remarks

Any other information may be elaborated here.

6. Collecting and/or characterization/evaluation site environment descriptors

6.1 Site environment

6.1.1 Topography

This refers to the profile in elevation of the land surface on a broad scale. (From FAO, 1990).

1	Flat	0 - 0,5%
2	Almost flat	0,6 - 2,9%
3	Gently undulating	3 - 5,9%
4	Undulating	6 - 10,9%
5	Rolling	11 - 15,9%
6	Hilly	16 - 30%
7	Steeply dissected	>30%, moderate elevation range
8	Mountainous	>30%, great elevation range (>300m)
99	Other (elaborate in descriptor **6.2 Remarks**)	

6.1.2 Higher level landform (general physiographic features)

The landform refers to the shape of the land surface in the area in which the site is located. (Adapted from FAO, 1990).

1 Plain
2 Basin
3 Valley
4 Plateau
5 Upland
6 Hill
7 Mountain

6.1.3 Land element and position

Description of the geomorphology of the immediate surroundings of the site. (Adapted from FAO 1990). (See Fig. 1).

1	Plain level	17	Interdunal depression
2	Escarpment	18	Mangrove
3	Interfluve	19	Upper slope
4	Valley	20	Midslope
5	Valley floor	21	Lower slope
6	Channel	22	Ridge
7	Levee	23	Beach
8	Terrace	24	Beachridge
9	Floodplain	25	Rounded summit
10	Lagoon	26	Summit
11	Pan	27	Coral atoll
12	Caldera	28	Drainage line (bottom position in flat or almost flat terrain)
13	Open depression		
14	Closed depression	29	Coral reef
15	Dune	30	Other (elaborate in appropriate section's **Remarks**)
16	Longitudinal dune		

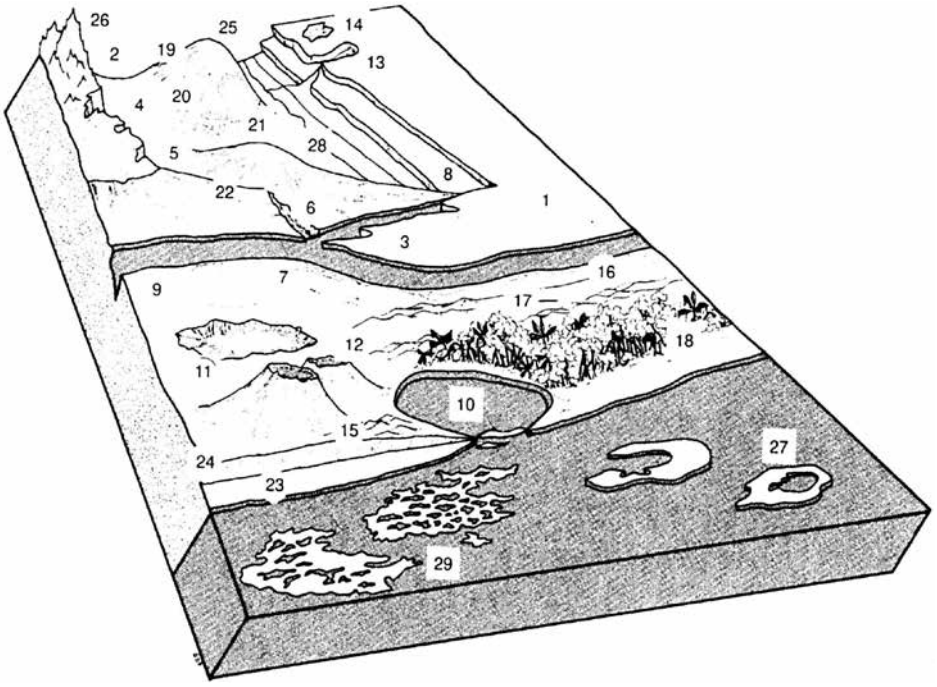

Fig. 1. Land element and position

6.1.4 Slope [°]

Estimated slope of the site.

6.1.5 Slope aspect

The direction the slope faces on which the accession was collected. Describe the direction with symbols N, S, E, W (e.g. a slope that faces a south-western direction has an aspect of SW).

6.1.6 Overall vegetation surrounding and at the site

(Adapted from FAO, 2006).

- 10 Herbaceous
  - 11 Grassland
  - 12 Forb land
- 20 Closed forest (continuous tree layer, crowns overlapping, large number of tree and shrub species in distinct layers)
- 30 Woodland (continuous tree layer, crowns usually not touching, understory may be present)
- 40 Scrubland
- 50 Dwarf shrubs
- 99 Other (elaborate in appropriate descriptor **Remarks**)

6.1.7 Material proceeding from soil

(Adapted from FAO, 1990). Two lists of examples of rock parent material are given below. The reliability of geological information and knowledge of local lithology will determine whether a general or a specific definition of the parent material can be provided. Saprolite is used if the *in situ* weathered material is thoroughly decomposed, clay-rich but still showing rock structure. Alluvial deposits and colluvium derived from a single rock type may be further specified by that rock type.

6.1.7.1 Unconsolidated material

- 1 Aeolian deposits
- 2 Aeolian sand
- 3 Litoral deposits
- 4 Lagoonal deposits
- 5 Marine deposits
- 6 Lacustrine deposits
- 7 Fluvial deposits
- 8 Alluvial deposits
- 9 Unconsolidated (unspecified)
- 10 Volcanic ash
- 11 Loess
- 12 Pyroclastic deposits
- 13 Glacial deposits
- 14 Organic deposits
- 15 Colluvial deposits
- 16 *In situ* weathered
- 17 Saprolite
- 99 Other (specify in descriptor **6.2 Remarks**)

6.1.7.2 Rock type

(Adapted from FAO, 1990)

1	Acid igneous/ metamorphic rock	16	Limestone
2	Granite	17	Dolomite
3	Gneiss	18	Sandstone
4	Granite/gneiss	19	Quartzitic sandstone
5	Quartzite	20	Shale
6	Schist	21	Marl
7	Andesite	22	Travertine
8	Diorite	23	Conglomerate
9	Basic igneous/ metamorphic rock	24	Siltstone
		25	Tuff
10	Ultra basic rock	26	Pyroclastic rock
11	Gabbro	27	Evaporite
12	Basalt	28	Gypsum rock
13	Dolerite	99	Other (specify in descriptor **6.2 Remarks**)
14	Volcanic rock	0	Unknown
15	Sedimentary rock		

6.1.8 Stoniness/rockiness/hardpan/cementation

1 Tillage unaffected
2 Tillage affected
3 Tillage difficult
4 Tillage impossible
5 Essentially paved

6.1.9 Soil drainage (Adapted from FAO, 2006)

3 Poorly drained
5 Moderately drained
7 Well drained

6.1.10 Soil salinity

1 <160 ppm of dissolved salt
2 160 – 240 ppm
3 241 – 480 ppm
4 >480 ppm

6.1.11 Soil depth to groundwater table

(Adapted from FAO, 1990).

The depth to the groundwater table, if present, as well as an estimate of the approximate annual fluctuation, should be given. The maximum rise of the groundwater table can be inferred approximately from changes in profile colour in many, but not all, soils.

1 0 – 25 cm
2 25,1 – 50 cm
3 50,1 – 100 cm
4 100,1 – 150 cm
5 >150 cm

6.1.12 Soil matrix colour

(Adapted from FAO, 2006).

The colour of the soil matrix material in the root zone around the accession is recorded in the moist condition (or both dry and moist condition, if possible) using the notation for hue, value and chroma as given in the Munsell Soil Color Charts (Munsell, 1975). If there is no dominant soil matrix colour, the horizon is described as mottled and two or more colours are given and should be registered under uniform conditions. Early morning and late evening readings are not accurate. Provide depth of measurement (cm). If colour chart is not available, the following states may be used:

1	White	7	Reddish brown	13	Greyish
2	Red	8	Yellowish brown	14	Blue
3	Reddish	9	Yellow	15	Bluish-black
4	Yellowish red	10	Reddish yellow	16	Black
5	Brown	11	Greenish, green		
6	Brownish	12	Grey		

6.1.13 Soil pH

Real value of soil within the interval of the following root depths around the accession.

1 pH at 0-10 cm
2 pH at 11-15 cm
3 pH at 16-30 cm
4 pH at 31-60 cm
5 pH at 61-90 cm

6.1.14 Soil erosion

3 Low
5 Intermediate
7 High

6.1.15 Rock fragments

Rocks and large mineral fragments (>2mm) are described according to their abundance (Adapted from FAO, 2006).

1 0 - 2%
2 2,1 – 5%
3 5,1 – 15%
4 15,1 – 40%
5 40,1 – 80%
6 >80%

6.1.16 Soil texture classes

For convenience in determining the texture classes of the following list, particle size classes are given for each of the fine earth fractions listed below. (See Fig. 2). (Adapted from FAO, 2006).

1 Clay
2 Loam
3 Clay loam
4 Silt
5 Silt clay
6 Silt clay loam
7 Silt loam
8 Sandy clay
9 Sandy clay loam
10 Sandy loam
    10.1 Fine sandy loam
    10.2 Coarse sandy loam
11 Loamy sand
    11.1 Loamy very fine sand
    11.2 Loamy fine sand
    11.3 Loamy coarse sand
12 Sand (unspecified)
    12.1 Very fine sand
    12.2 Fine sand
    12.3 Medium sand
    12.4 Coarse sand

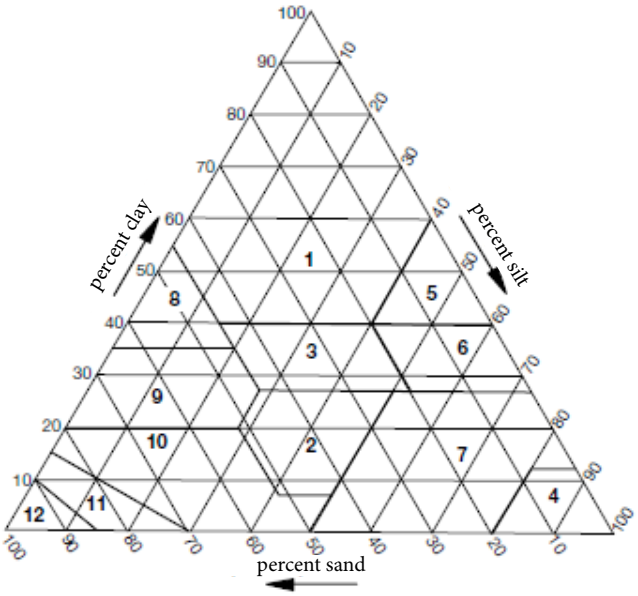

Fig. 2. Soil texture classes

6.1.17 Soil organic matter content

1 Nil (as in arid zones)
2 Low (as in long-term cultivation in a tropical setting)
3 Medium (as in recently cultivated but not yet much depleted)
4 High (as in never cultivated, and in recently cleared forest)
5 Peaty

6.1.18 Taxonomic soil classification

Most detailed classification should be provided. It can be taken from a soil study map. Provide type of soil (e.g. Alfisols, Spodosols, Vertisols, etc.).

6.1.19 Water availability

1 Rainfed
2 Irrigated
3 Flooded
4 River banks
5 Sea coast
99 Other (elaborate in appropriate descriptor **Remarks**)

6.1.20 Climate of the site

Should be assessed as close to the site as possible.

6.1.20.1 **Temperature** [°C]
Provide either the monthly or the annual mean minimum and maximum temperature.

6.1.20.1.1 **Number of recorded years**

6.1.20.2 **Rainfall** [mm]
Provide either the monthly or the annual mean (state number of recorded years).

6.1.20.2.1 **Number of recorded years**

6.1.20.3 **Duration of the dry season**

6.1.20.4 **Relative humidity**

6.1.20.4.1 **Relative humidity diurnal range** [%]

6.1.20.4.2 **Relative humidity seasonal range** [%]

6.1.20.5 **Wind** [m/s]
Annual mean.

6.1.20.5.1 **Number of recorded years**

6.2 Remarks
Specify here if frosts, typhoons or other relevant atmospheric problems were registered.

CHARACTERIZATION

7. Plant descriptors

For all quantitative descriptors, record the mean of randomly selected plants avoiding border ones. For quantitative descriptors, records should be based on the 50% of the population. This category contains a list of minimum descriptors important to discriminate and use quinoa, which are highlighted in the text and marked with an asterisk (*).

List of minimum descriptors to discriminate and use quinoa

This is an initial key set of descriptors that will immediately assist researchers to more easily use quinoa stored in genebanks. This list is useful to describe, discriminate and especially to increase germplasm utilization:

Number	Descriptor name
7.8.2	Panicle colour at flowering
7.8.3	Panicle colour at physiological maturity
7.8.4	Panicle shape
7.8.5	Panicle length [cm]
7.8.6	Panicle width [cm]
7.8.7	Panicle density
7.9.1	Dehiscence degree
7.9.4	Grain width [mm]
7.9.6	1000-grain weight [g]
7.9.8	Seed yield per plant [g]
7.9.10	Pericarp colour
7.9.12	Episperm colour
8.4	Number of days to start of flowering [d]
8.5	Number of days to 50% flowering [d]
8.9	Number of days to 50% physiological maturity [d]
8.10	Saponin presence
8.12	Harvest index
8.13	Seed protein content [% DW]
8.14	Seed protein composition
9.1	Reaction to frost
9.3	Reaction to drought
10.1.2	*Eurysacca quinoae*
10.2.1.1	*Peronospora farinosa*

7.1 Sowing density

3 Low
5 Intermediate
7 High

7.2 Type of growth (4.1)

1 Herbaceous
2 Shrubby

7.3 Growth habit (4.4.1)

See Fig. 3.

1 Simple
2 Branched to bottom third
3 Branched to second third
4 Branched with main panicle undefined

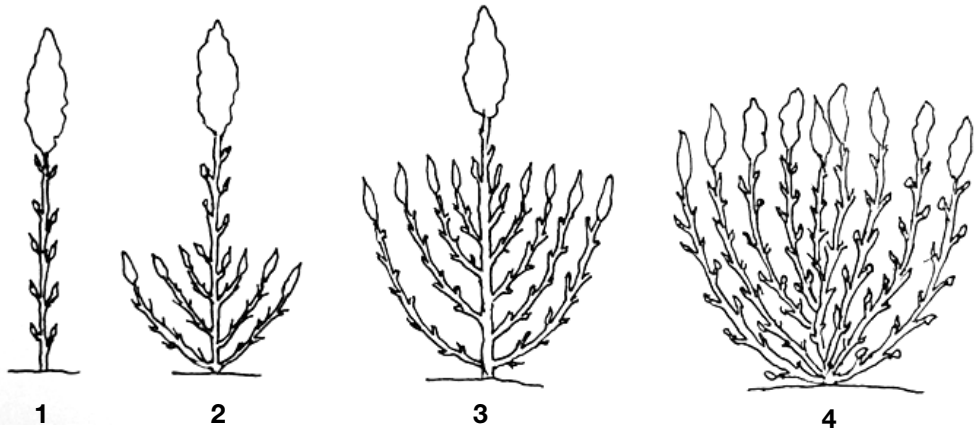

Fig. 3. Growth habit

7.4 Plant height [cm] (6.3)

Recorded at physiological maturity, from root collar to panicle apex. Average of 10 plants.

7.5 Stem

7.5.1 Main stem shape (4.3.2)

Cross sectional view. Observed on the bottom third at physiological maturity. See Fig. 4.

1 Cylindrical
2 Angular

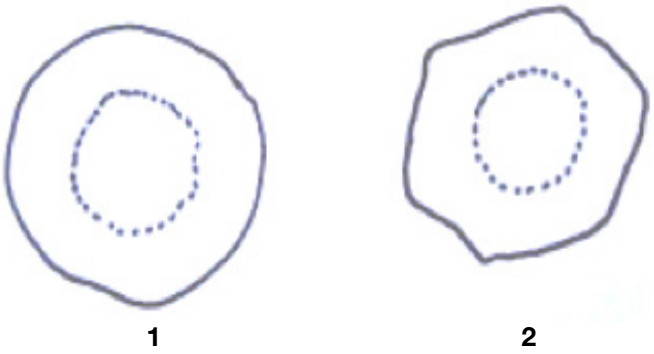

Fig. 4. Main stem shape
(cross sectional view)

7.5.2 Main stem diameter [mm] (4.3.3)
Recorded in the middle of the plant bottom third, at physiological maturity. Average of at least 10 plants.

7.5.3 Main stem colour
Record the predominant colour of main stem, at physiological maturity.

1 White
2 Purple
3 Red
4 Pink
5 Yellow
6 Orange
7 Brown
8 Grey
9 Black
10 Green
99 Other (elaborate in descriptor **7.10 Remarks**)

7.5.4 Presence of pigmented axils (4.3.4)
Observed in the intersection of main stem and primary branches, at flowering.

0 Absent
1 Present
2 Undetermined (e.g. plants with red stem and branches, where the presence of pigmented axils cannot be seen.)

7.5.5 Presence of striae (4.3.5)

Observed on the main stem at plant flowering.

0 Absent
1 Present

7.5.6 Striae colour (4.3.6)

Observed in the middle part of mid third at full flowering.

1 Green
2 Yellow
3 Red
4 Purple
99 Other (elaborate in descriptor **7.9, Remarks**)

7.5.7 Plant lodging [%]

Recorded as the ratio between number of lodged plants over total number of plants of the accession.

7.5.7.1 Phenological phase

Indicate the phenological phase when it has occurred.

7.6 Branching (4.4)

7.6.1 Presence of branching (4.4.1)

0 Absent
1 Present

7.6.2 Number of primary branches (4.4.2)

Record the number of branches from the base to the second third of the plant, at physiological maturity.

7.6.3 Position of primary branches (4.4.3)

1 Oblique from main stem
2 Slightly curved from the base

7.7 Leaf (4.5)

Description of the mid third leaves of main stem, selected from at least 10 plants. At full flowering.

7.7.1 Leaf shape (4.5.1/4.5.2)

1 Rhomboidal
2 Triangular

7.7.2 Leaf margin (4.5.3)

1 Entire
2 Dentate
3 Serrate

7.7.3 Number of teeth on leaf blade (4.5.4)

Total number of teeth per leaf, average of at least 10 basal leaves (one leaf per plant).

7.7.4 Petiole length [cm] (4.5.5)

Average of at least 10 plants (one leaf per plant). See Fig. 5.

7.7.5 Maximum leaf length [cm] (4.5.6)

Average of at least 10 plants (one leaf per plant). See Fig. 5.

7.7.6 Maximum leaf width [cm] (4.5.7)

Average of at least 10 plants (one leaf per plant). See Fig. 5.

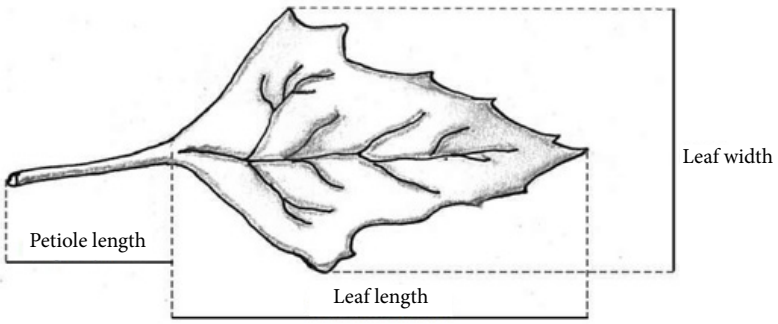

Fig. 5. Leaf measurements

7.7.7 Petiole colour

1 Green
2 Green – red (ridged/variegated)
3 Red

7.7.8 Leaf lamina colour

1 Green
2 Green – red (ridged/variegated)
3 Red

7.7.9 Leaf granules colour

Observed at full flowering.

0 Absent
1 White
2 White – red (ridged/variegated)
3 Purple
4 Red

7.8 Inflorescence (4.6)

7.8.1 Male sterility

Observed at full flowering.

0 Absent (stigma exsertion)
1 Present (absence of anthers)

*7.8.2 Panicle colour at flowering (4.6.1)

1 Green
2 Purple
3 Red
4 Mixture (purple and red)

*7.8.3 Panicle colour at physiological maturity (4.6.3)

1 White
2 Purple
3 Red
4 Pink
5 Yellow
6 Orange
7 Brown
8 Grey
9 Black
10 Red and white
11 Red and pink
12 Red and yellow
13 Green
14 Red and green
99 Other (elaborate in descriptor **7.10 Remarks**)

***7.8.4 Panicle shape** (4.6.6)

See Fig. 6.

1 Glomerulate (glomerules are inserted in the primary axis showing a globose shape)
2 Intermediate (showing both shapes)
3 Amarantiform (glomerules are inserted directly in the secondary axis and have an elongated shape)

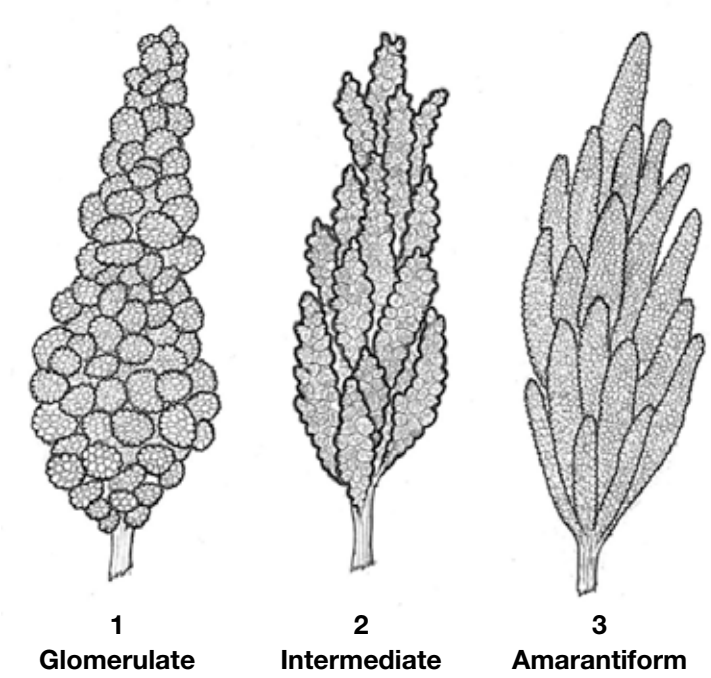

Fig. 6. Panicle shape

***7.8.5 Panicle length** [cm] (4.6.7)

Measured from main panicle base to tip, at physiological maturity. Average of at least 10 plants.

***7.8.6 Panicle width** [cm]

Record the maximum width of main panicle, at physiological maturity. Average of at least 10 plants.

***7.8.7 Panicle density** (4.6.8)

1 Lax
2 Intermediate
3 Compact

7.9 Grain characteristics (4.7)

*7.9.1 Dehiscence degree

Observe the grain persistence in the plant at physiological maturity, preferably at midday.

1 Light
2 Regular
3 Strong

7.9.2 Perigonium appearance

Recorded at physiological maturity.

1 Semi-opened
2 Closed (completely covers the grain)

7.9.3 Perigonium colour (4.7.1)

1 Green
2 White
3 Cream
4 Yellow
5 Golden yellow
6 Pink
7 Red
8 Orange
9 Light coffee
10 Coffee
11 Dark coffee
12 Reddish coffee
13 Purple
14 Grey
15 Black
99 Other (elaborate in descriptor **7.10 Remarks**)

*7.9.4 Grain width [mm]

Average of 20 grains, excluding the perigonium.

7.9.5 Grain thickness [mm]

Average of 20 grains, excluding the perigonium.

*7.9.6 1000-grain weight [g] (5.5)

Record weight, excluding the perigonium.

7.9.7 Grain hectolitre weight [g/cm³]
Grain weight in a known volume.

***7.9.8 Seed yield per plant** [g]
Average of at least 10 plants.

7.9.9 Pericarp aspect
1 Ashen
2 Sucrose

***7.9.10 Pericarp colour**
1 Cream
2 Yellow
3 Golden yellow
4 Pink
5 Red
6 Light coffee
7 Coffee
8 Dark coffee
9 Greenish coffee
10 Purple
99 Other (elaborate in descriptor **7.10 Remarks**)

7.9.11 Episperm appearance
1 Vitreous (translucent hyaline)
2 Opaque

***7.9.12 Episperm colour** (4.7.3)
1 Transparent
2 White
3 Cream
4 Light coffee
5 Coffee
6 Dark coffee
7 Reddish coffee
8 Black
99 Other (elaborate in descriptor **7.10 Remarks**)

7.9.13 Grain shape (4.7.6)

See Fig. 7.

1 Lenticular
2 Cylindrical
3 Ellipsoid
4 Conical

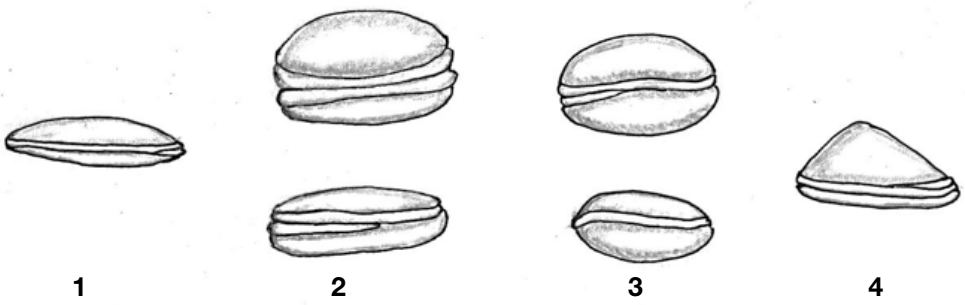

Fig. 7. Grain shape

7.10 Collector remarks

Specify any additional information recorded by the collector, or any specific information on any state of the above mentioned descriptors.

EVALUATION

8. Plant descriptors

8.1 **Sowing date** [YYYYMMDD]

8.2 **Emergence vigour** (6.1)

Vigour embraces those characteristics determining seed capabilities during seedling germination and emergence.

1 Low
2 Regular
3 High

8.3 **Number of days to floral bud formation** [d]

From sowing until 50% of plants have floral buds.

*8.4 **Number of days to start of flowering** [d] (6.2)

Number of days from sowing until 50% of plants have started flowering.

*8.5 **Number of days to 50% of flowering** [d]

From sowing until 50% of plants have reached 50% flowering.

8.6 **Number of days to end of flowering** [d]

From sowing until 100% of plants have opened flowers.

8.7 **Number of days to milk stage** [d]

From sowing until 50% of plants release whitish liquid if pressed.

8.8 **Number of days to soft dough stage** [d]

From sowing until 50% of plants have reached a soft dough appearance.

*8.9 **Number of days to 50% physiological maturity** [d] (5.2)

*8.10 **Presence of saponin** (7.1)

0 Absent
1 Present

8.11 Eflusion of saponin

Foam produced in test tubes after stirring 0,5 g of the sample in 5 ml of distilled water.

0 None
3 Few
5 Intermediate
7 Many

*8.12 Harvest index

HI = (GW/BW+GW * 100)
GW: Grain weight
BW: Brushwood weight

*8.13 Seed protein content [% DW] (7.3)

Percentage of 100 g of dry seed weight.

*8.14 Seeds protein composition [mg/g of protein] (7.4)

8.14.1 Essential amino acids

1 Lysine
2 Leucine
3 Isoleucine
4 Valine
5 Methionine
6 Phenylalanine
7 Threonine
8 Thryptophan
99 Other (elaborate in descriptor **8.15 Remarks**)

8.15 Remarks

Elaborate here any additional information on the status of the above mentioned descriptors.

9. Abiotic stress susceptibility

Scored under natural conditions, which should be clearly specified. These are coded on a susceptibility scale from 1 to 9:

1 Very low or no visible sign of susceptibility
3 Low
5 Intermediate
7 High
9 Very high

*9.1 Reaction to frost

Recorded under natural conditions during cold or warm season.

9.2 Reaction to high temperatures

Recorded under natural conditions during warm season.

*9.3 Reaction to drought

Recorded under natural conditions during diurnal period for at least four weeks.

9.4 Reaction to high soil moisture

9.5 Reaction to hail

9.6 Remarks

Elaborate here any additional information about abiotic stress susceptibility.

10. Biotic stress susceptibility

In each case, it is important to state the origin of the infestation or infection, i.e. natural, field inoculation, laboratory. Record such information in descriptor **10.4 Remarks**. These are coded on a susceptibility scale from 1 to 9:

0 Absent
1 Very low or no visible signs of susceptibility
3 Low
5 Intermediate
7 High
9 Very high

10.1 Pests

10.1.1	*Helicoverpa gelotopoeon* *Helicoverpa atacamae* *Copitarsia incommoda* *Agrotis andina* *Dargida acanthus* *Heliothis titicacae* *Feltia andina*	'Ticonas', 'ticuchis', 'rafaelito', 'almakepi'

***10.1.2**	***Eurysacca quinoae***	**Quinoa moth, 'Qhona qhona', 'Qhaqo'**
10.1.3	*Eurysacca melanocampta*	Quinoa 'kepicha', 'Pilipintu'
10.1.4	*Liriomiza huidobrensis*	Leaf miner
10.1.5	*Epicauta* sp.	'Padre kuru' 'Karhua'
10.1.6	*Epitrix* sp.	Flea beetle, 'Piki piki'
10.1.7	*Aphis* sp. - *Myzus* sp.	Aphids
10.1.8	*Frankiniella tuberosi*	Thrips 'Llaja'
10.1.9	*Anacuerna centrolinea*	'Tunku tunku'

10.2 Diseases

10.2.1 Fungi

***10.2.1.1**	***Peronospora farinosa***	**Downy mildew**
10.2.1.2	*Ascochyta hyalospora*	Leaf spot

10.2.2 Bacteria

10.2.2.1	*Pseudomonas* sp.	Bacterial spot

10.2.3 Nematodes

10.2.3.1	*Nacobbus* sp.	False root-knot nematode
10.2.3.2	*Heterodera* sp.	Cyst nematode

10.3 Damage caused by birds

Using a numerical scale, indicate damage caused by birds or granivorous birds.

10.4 Remarks

Elaborate here any additional information about biotic stress susceptibility.

11. Biochemical markers

Specify method used and cite reference(s). Refer to *Descriptors for genetic marker technologies*, available in PDF format from Bioversity International web site (http://www.bioversityinternational.org/) or by email request to bioversityinternational-publications@cgiar.org.

12. Molecular markers

Specify method used and cite reference(s). Refer to *Descriptors for genetic marker technologies*, available in PDF format from Bioversity International web site (http://www.bioversityinternational.org/) or by email request to bioversityinternational-publications@cgiar.org.

13. Cytological characters

13.1 Number of mitotic chromosomes

13.2 Ploidy level

(2x, 3x, 4x).

13.3 Other cytological characters

14. Identified genes

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CONTRIBUTORS

Authors

Rojas, Wilfredo - PROINPA, Bolivia
Padulosi, Stefano - Bioversity International, Italia

Advisory Group

Alvarez, Natalia - NOA (IPAF)-INTA, Argentina
Bazile, Didier - CIRAD, France
Bonifacio, Alejandro - PROINPA, Bolivia
Brenner, David - US National Plant Germplasm System, USA
Catacora Ccama, Policarpio - INIA, Peru
Fuentes, Francisco - Rutgers University, USA
Mazon Ortiz, Nelson - INIAP, Ecuador
Mujica Sánchez, Angel - Universidad Nacional del Altiplano, Peru
Pinto Porcel, Milton - PROINPA, Bolivia
Tapia, Mario - ANPE, Peru
Tejada López, Gonzalo - FAO-RLC, Chile

Reviewers

Argentina

Bertero, Daniel - Universidad de Buenos Aires y CONICET
Gonzales, Juan Antonio - Fundación Miguel Lillo

Belgium

Scheldeman, Xavier - CropDesign

Bolivia

Alanoca Quispe, Carolina - INIAF
Alcocer Vargas, Elsa - LAYSAA S.R.L.
Cayoja Orosco, María Rosario - Fundación Altiplano, IDEPRO, FAUTAPO
Espindola, Gualberto - Independent (Ex Estación Experimental Patacamaya)
Mamani Mamani, Armando - INIAF
Mamani Reynoso, Félix - Universidad Mayor de San Andrés
Marconi Valda, Jose Luis - FAO-INIAF
Morales, Eddy - INIAF
Polar, Vivian - PROINPA
Quispe Ticona, Roberto - FDTA - Valles
Saravia Zurita, Raul - PROINPA
Soraide Lozano, David - FAUTAPO
Soto Mendizabal, José Luis - Independent
Taranto, Stephen - La Paz on Foot
Vargas Mena, Amalia - PROINPA

Brasil
Quadros Ribeiro, Júnior Walter - EMBRAPA

Chile
De La Torre Herrera, José - Universidad Arturo Prat
Martínez Mosqueira, Enrique Alfonso - Corporación Centro de Estudios Avanzados en Zonas Áridas (CEAZA)
Salazar, Erika - Instituto de Investigaciones Agropecuarias
Sanchez, Matias - Universidad Arturo Prat
Thomet Isla, Max - CET Sur
Von Baer Jahn, Ingrid - Agrogen

Ecuador
Monar Benavides, Carlos Marcial - Universidad Estatal de Bolívar
Peralta Idrovo, Miguel Eduardo - Instituto Nacional Autónomo de Investigaciones Agropecuarias

France
Winkel, Thierry - IRD – Research Institute for Development

Italy
Alercia Adriana - Bioversity International

Peru
Apaza Mamani, Vidal - INIA Puno
Bravo Portocarrero, Rosario - UNA
Cahuana Jorge, José Luis - INIA - Illpa
Canahua Murillo, Alipio - FAO - Ministerio del Ambiente
Choque, Yohon - Fortigrano E.I.R.L.
Estrada Zúñiga, Rigoberto - INIA
Marca Vilca, Saturnino - Empresa Productora de Semillas S.A.
Ponce Carhuamaca, Jhonny Raúl - BIO LATINA SAC
Quispe Quispe, Moises - Asociación Nacional de productores Ecológicos del Perú (ANPE)
Rayda Gómez Pando, Luz - Universidad Nacional Agraria de La Molina
Torres Ticona, Lucio - NIISA Corp. S.A.
Valdivia Fernández, Roberto E. - Centro Internacional de la Papa (CIP)

Portugal
Almeida Pinehiro de Carvalho, Miguel Ângelo - ISOPlexis, Universidade da Madeira

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Annex I: COLLECTING FORM for quinoa and wild relatives

SAMPLE IDENTIFICATION

COLLECTING MISSION/IDENTIFIER (2.1):

COLLECTING INSTITUTE(S) CODE (2.2):

COLLECTING NUMBER (2.3): PHOTOGRAPH No (2.19):

COLLECTING DATE OF SAMPLE [YYYYMMDD] (2.4):

GENUS (1.7): SPECIES (1.8):

COLLECTING SITE LOCATION

COUNTRY OF ORIGIN (2.5):

LOCATION OF COLLECTING SITE (2.6): km: direction: from:

LATITUDE (2.7/2.7a): LONGITUDE (2.8/2.8a):

ELEVATION OF COLLECTING SITE (2.12): m asl

COLLECTING SITE ENVIRONMENT (or origin)

COLLECTING/ACQUISITION SOURCE (or origin) (2.13):
10. Wild habitat
20. Farm or cultivated habitat
30. Market or shop
40. Institute/Experimental station/ Research organization/Genebank
50. Seed company
60. Weedy, disturbed or ruderal habitat
99. Otro (especificar, por ej. desconocido):

AGROECOLOGICAL CROP AREA (2.13.1):
1. Interandean valley 2. Highland 3. 'Salares' 4. Sea level
5. 'Yunga' 6. 'Puna' 99. Other (elaborate):

SLOPE [°] (6.1.4): SLOPE ASPECT (6.1.5): (code N,S,E,W)

SOIL TEXTURE CLASSES (6.1.16): Specify class (e.g. clay, silt, loamy sand)

TAXONOMIC SOIL CLASSIFICATION (6.1.18):
Indicate class (e.g. Alfisols, Spodosols, Vertisols)

WATER AVAILABILITY (6.1.19):
1. Rainfed 2. Irrigated 3. Flooded 4. River banks
5. Sea coast 99. Other (elaborate):

RAINFALL (6.1.20.2): Annual mean: _____ mm

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AGO	SEP	OCT	NOV	DEC
Monthly mean [mm]:	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|

TEMPERATURE (6.1.20.1): Seasonal mean: _____ °C

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AGO	SEP	OCT	NOV	DEC
Monthly mean [°C]:	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|

SAMPLE

BIOLOGICAL STATUS OF ACCESSION (2.14):
100. Wild
200. Weedy
300. Traditional cultivar/landrace
400. Breeding/research material
999. Other (elaborate):
500. Advanced or improved cultivar (conventional breeding methods)
600. GMO (by genetic engineering)

VARIABILITY OF POPULATION (2.15)
1. Uniform 2. Low variability 3. Variable 4. High variability

NUMBER OF PLANTS SAMPLED (2.17):

PREVAILING STRESSES (2.21):
Information on main associated stresses e.g. abiotic (drought) and/or biotic (pests, diseases, etc.)

ETHNOBOTANICAL DATA

LOCAL VERNACULAR NAME (2.18.1):

ETHNIC GROUP (2.18.2):

PARTS OF THE PLANT USED (2.18.3.1):
1. Grain 2. Leaves 3. Stem 4. Root 99. Other (elaborate):

TRADITIONAL USE
Food (Human) (2.18.3.2)
1. Tender leaves
2. Cooked grain (soups, stews, 'pesque', 'graneado')
3. Roasted grain
4. Roasted and milled grain ('pito de quinoa')
5. Flour (bread and biscuit ('Kispiña/ Tajoles'))
6. Refreshment/'Ullphu'
7. 'Llipta / Llujta / Lejia'
99. Other (elaborate):

Feed (Animal) (2.18.3.3)
1. Green fodder 2. Dry fodder (hay) 3. By-threshing ('jipi, broza, quiri')
4. Flour 99. Other (elaborate):

Medicine (2.18.3.4)
1. Anaemia 2. Diarrhoea 3.Tuberculosis 4. Rheumatism
5. High altitude sickness 6. Fatigue 7. Fracture 8. Hypocalcaemia
9. Diuretic 10. Antipyretic 99. Other (elaborate):

CHARACTERIZATION

Growth habit (7.3)
Main stem colour (7.5.3)
Panicle colour (indicate phenological phase)
Panicle shape (indicate phenological phase)
Panicle density (7.8.7)
Dehiscence degree (7.9.1)
Seed yield per plant [g] (7.9.8)
Pericarp colour (7.9.10)

Collector notes:

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