

Novel characterization of crop wild relative and landrace resources as a basis for improved crop breeding' PGR Secure EC FPVII, GA n. 266394



# ***DESCRIPTORS FOR WEB-ENABLED NATIONAL IN SITU LANDRACE INVENTORIES***

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## Note of the Authors

Landraces are part of agro-biodiversity in urgent need of conservation. A prerequisite of any active conservation is some form of inventory of what is conserved.

In this context, the EC Framework 7 PGR Secure project is aimed to provide help in generating National Landrace Inventories in European countries and so to begin the process of creating a European Landrace Inventory pivoted on the National Inventories.

A European LR Inventory can only be based on National Inventories considered that the responsibility to conserve and sustainably use landrace diversity (as well as any other biodiversity component) lies with individual Nations and that any concerted action will be implemented at national level, even when driven by policy at European level.

This draft descriptor list was worked out to facilitate the development of National Inventories of landraces that are still maintained *in situ* (i.e. on farm or in garden).

It was drafted to record different types of information that were discussed at the "Crop Wild Relative and Landrace Conservation Training Workshop" held in Palanga Lithuania, 7-9 September 2011 by the *in situ* National Inventory Focal Points, the ECPGR Documentation and Information Network members and the PGR Secure team working on landraces.

However, it also takes into account the contribution that the ECPGR On-farm Conservation and Management Working Group of the In Situ and On-Farm Conservation Network gave through years to the definition of descriptors for extant landraces (see draft descriptor list downloadable from [http://www.ecpgr.cgiar.org/networks/in\\_situ\\_and\\_on\\_farm/on\\_farm\\_wg.html](http://www.ecpgr.cgiar.org/networks/in_situ_and_on_farm/on_farm_wg.html)).

The draft descriptor list includes fields related to the Inventory, taxon, landrace, site and farmer identification, the landrace status, characteristics and use and finally fields concerning conservation and monitoring actions eventually taken in favour of the landrace diversity maintenance.

Fields with one asterisk (\*) indicate the most relevant fields that were suggested as 'mandatory' by the National Inventory Focal Points and ECPGR Documentation Working Group at the Palanga workshop.

In addition, an added asterisk (\*\*) indicates fields that are of particular relevance also for the PGR secure purposes.

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# Descriptors For Web-Enabled National *In Situ* Landrace (LR) Inventories

## Index

	Page
<b>1. INVENTORY IDENTIFICATION</b>	4
<b>2. TAXON IDENTIFICATION</b>	5
<b>3. LANDRACE/POPULATION IDENTIFICATION</b>	6
<b>4. SITE/LOCATION IDENTIFICATION</b>	7
<b>5. THE FARMER (I.E. THE MAINTAINER)</b>	10
<b>6. THE LANDRACE</b>	11
<b>7. CONSERVATION AND MONITORING</b>	16
<b>8. REMARKS</b>	17
<b>Cited bibliography</b>	18

## 1. INVENTORY IDENTIFICATION

### 1.1. National Inventory code (NICODE) \*

Country code identifying the National *in situ* LR Inventory; the code of the country preparing the National Inventory. For country codes use the three-letter ISO 3166-1 (see: <http://unstats.un.org/unsd/methods/m49/m49alpha.htm>)

Example: NLD

### 1.2. National Inventory edition number (NIENUMB) \*

Code identifying the edition of the National *in situ* LR Inventory made up of the edition number and the year of publication.

Example: the first edition that is compiled in 2012 will be coded as 001/2012

Example: the second edition that is compiled in 2014 will be coded 002/2014

### 1.3. Institute code (INSTCODE) \*

FAO WIEWS code of the institute (see: [http://apps3.fao.org/wiews/institute\\_query.htm?i\\_l=EN](http://apps3.fao.org/wiews/institute_query.htm?i_l=EN)) who is responsible at the national level for the production of the National *in situ* LR Inventory.

Example: NLD037

## 2. TAXON IDENTIFICATION

### 2.1. Genus (GENUS) \*\*

Genus name for taxon, in Latin. Initial uppercase letter required.

Example 1: *Vigna*

Example 2: *Vicia*

### 2.2. Species (SPECIES) \*\*

Specific epithet portion of the scientific name, in Latin, in lower case letters.

Example 1: *unguiculata*

Example 2: *faba*

### 2.3. Species authority (SPAUTHOR) \*\*

The authority for the species name.

Example 1: (L.) Wald.

Example 2: L.

### 2.4. Subtaxa (SUBTAXA)

This field can be used to store any additional taxonomic identifier (in Latin, in lower case letters) preceded by the rank (for example: subspecies, convariety, variety, form, cultivar group). The following abbreviations are foreseen for the rank: 'subsp.' (for subspecies); 'convar.' (for convariety); 'var.' (for variety); 'f.' (for form), 'Group' (for cultivar group).

Example 1: subsp. *sesquipedalis*

Example 2: subsp. *faba* var. *minuta*

### 2.5. Subtaxa authority (SUBTAUTHOR)

The subtaxa authority at the most detailed taxonomic level.

Example 1: (L.) Verdc.

Example 2: (hort. ex Alef.) Mansf.

### 2.6. Taxonomic references (TAXREF)

Taxonomy used by Inventory compiler to identify the material (e.g.. The Plant List, Euro+Med PlantBase, GRIN taxonomy, etc)

Example 1: The Plant List

Example 2: GRIN Taxonomy

### 2.7. Common crop name (CROPNAME)

Name of the crop in colloquial language, preferably English if any.

Example1: yard-long-bean

Example2: tick-bean

### 3. LANDRACE/POPULATION IDENTIFICATION

#### 3.1. Landrace *in situ* recording date (LRRECDATE)

Date on which the LR was recorded in the current *in situ* Inventory, as YYYYMMDD. Missing data (MM or DD) should be indicated with zeros. Leading zeros are required.

Example: 19980000

Example: 20020620

#### 3.2. Landrace number (LRNUMB) \*\*

Unique progressive number which identifies the *in situ* LR in the Inventory, not to be duplicated (i.e. reassigned) for other LRs or the same LR that is cultivated by other farmers in the current Inventory. To be assigned by the institute which is responsible at the national level for the production of the National LR *in situ* Inventory.

Example: 00010

#### 3.3. Landrace local name/s (LRNAME) \*\*

Local name/s of the LR in the colloquial language of the farm. Free text.

Example: fagiolina, cornetti, fagiolino dall'occhio

#### 3.4. Landrace language code/s (LRLANG)

The language code of the LR local name. Use ISO 639-2 is the alpha-3 code in Codes for the representation of names of languages (see: [http://www.loc.gov/standards/iso639-2/php/code\\_list.php](http://www.loc.gov/standards/iso639-2/php/code_list.php)).

## 4. SITE/LOCATION IDENTIFICATION

### 4.1. Farm location: primary administrative subdivision of the country where farm is located (FARMFIRSTADMIN)

Name of the primary administrative subdivision of the country where the farm is located for the most part of its extension. Free text.

Example: Umbria Region

### 4.2. Farm location: secondary administrative subdivision (FARMSECONDADMIN)

Name of the secondary administrative subdivision (within the primary administrative subdivision) of the country where the farm is located. Free text.

Example: Perugia Province

### 4.3. Farm location: lowest administrative subdivision (FARMLOWESTADMIN)

Name of the lowest administrative subdivision (i.e. municipality). Free text.

Example: Panicale municipality

### 4.4. Location of the nearest known place. (LOCATION)

Information relevant to the nearest known place, distance from nearest named place, and directions from the nearest named place. Descriptive field as detailed as possible. Free text.

Example: 7 km south of Panicale towards Perugia on SS.74

### 4.5. Farm coordinates

Coordinates of the farm house or headquarters, to be recorded as either Degrees Minutes and Seconds-DMS or Decimal Degrees- DD as specified below.

#### 4.5.1. Latitude of farm site (FLATDMS) \*\*

Degrees (2 digits) minutes (2 digits), and seconds (2 digits) followed by N (North) or S (South). Every missing digit (minutes or seconds) should be indicated with a zero. Leading zeros are also required for figures that are lower than ten.

Example: 45° (i.e. 45 degrees), 4' (i.e. 4 minutes) and unknown seconds North (Turin latitude) is coded as 450400N

Example: 45°, 4' and 8'' (i.e. 8 seconds) North (Turin\_Mole Antonelliana latitude) is coded as 450408N

Example: 40° 25' 6" N (Madrid) is coded as 402506N

Example: 00° 13' 23" S (Quito) is coded as 001323S

**OR**

#### 4.5.1.BIS Latitude of farm site (FLATDD) \*\*

Latitude expressed in decimal degrees. Degree measurements should be written with decimal places like 45.069031° with the degree symbol behind the decimals. Every missing digit should be indicated with a zero. Positive values are North of the Equator; negative values are South of the Equator.

Example: the same latitude of Turin\_Mole Antonelliana reported above is coded as 45.069031°

Example: the Madrid latitude reported above is coded as 40.418446°

Example: the Quito latitude reported above is coded as -0.222900°

#### 4.5.2. Longitude of farm site (FLONGDMS) \*\*

Degrees (3 digits), minutes (2 digits), and seconds (2 digits) followed by E (East) or W (West). Every missing digit (minutes or seconds) should be indicated with a zero. Leading zeros are also required for figures lower than ten.

Example: 7° 41' and unknown seconds E (Turin) is coded as 0074100E (2 zeros before the 7 degrees because longitude varies from 0 and 180 degrees and needs 3 digits).

Example: 7° 41' 36" E (Turin\_Mole Antonelliana longitude) is coded as 0074135E

Example: 3°42' 51" W (Madrid) is coded as 0034251W

Example: 78° 30' 19" W (Quito) is coded as 0783019W

**OR**

**4.5.2. BIS Longitude of farm site (FLONGDD) \*\***

Longitude expressed in decimal degrees. Degree measurements should be written with decimal places like 74.044636° with the degree symbol behind the decimals. Every missing digit should be indicated with a zero. Positive values are East of the Greenwich Meridian; negative values are West of the Greenwich Meridian.

Example: the same longitude of Turin\_Mole Antonelliana reported above is coded as 7.693154°

Example: the same longitude of Madrid reported above is coded as -3.714277°

Example: the same longitude of Quito reported above is coded as -78.505386°

**4.5.3. Geodetic datum (FEPSGCODE)**

The geodetic datum or spatial reference system upon which the coordinates given in decimal latitude and decimal longitude are based. If not known, use 'not recorded', when not known the default WGS 1984 Datum will be used.

Example: WGS84 (for World Geodetic System 1984 – EPSG 4326)

**4.5.4. Geographic data recording system (FGPS)**

Data recorded by GPS: Yes or No.

	Code
Yes	10
No	20

**4.5.5. Maximum error distance (FRADIALED)**

To be compiled if the field GPS is 'No'. The upper limit of the distance (in meters) from the given latitude and longitude describing a circle within which the whole of the described locality must lie.

**4.6. Elevation of farm site (FELEVATION) \*\***

Elevation of farm site expressed in meters above sea level. Negative values are allowed.

Example: 763

**4.7. Coordinates of the LR site**

Coordinates of the field where the LR is/has been grown in the year the Inventory is compiled; to be recorded as either Degrees Minutes and Seconds-DMS or Decimal Degrees- DD, as described above for 'Farm coordinates'.

**4.7.1. Latitude of LR site (LRSLATDMS) \*\***

Degrees (2 digits) minutes (2 digits), and seconds (2 digits) followed by N (North) or S (South).

**OR**

**4.7.1.BIS Latitude of LR site (LRSLATDD) \*\***

Latitude expressed in decimal degrees.

**4.7.2. Longitude of LR site (LRSLONGDMS) \*\***

Degrees (3 digits), minutes (2 digits), and seconds (2 digits) followed by E (East) or W (West)

**OR**

**4.7.2. BIS Longitude of LR site (LRSLONGITUDEDD) \*\***

Longitude expressed in decimal degrees.

**4.7.3. Geodetic datum (LRSEPSGCODE)**

The geodetic datum or spatial reference system upon which the coordinates given in decimal latitude and decimal longitude are based. If not known, use 'not recorded', when not known the default WGS 1984 Datum will be used.



#### 4.7.4. Geographic data recording system (LRSGPS)

Data recorded by GPS: Yes or No.

	Code
Yes	10
No	20

#### 4.7.5. Maximum error distance (LRSRADIALED)

To be compiled if the field GPS is 'No'. The upper limit of the distance (in meters) from the given latitude and longitude describing a circle within which the whole of the described locality must lie.

#### 4.8. Elevation of LR site (LRSELEVATION) \*\*

Elevation of LR site expressed in meters above sea level. Negative values are allowed.

## 5. THE FARMER (I.E. THE MAINTAINER)

(Note: may be not a farmer in a 'legal' sense, he/she can be, for example, a home gardener whose main activity is something different from farming.)

### 5.1. Farmer identification number (FARMERID)

Unique number identifier of the farmer who maintains the LR and provides information (Landrace maintainer unique ID to be held in database). It is assigned by the institute that is responsible at the national level for the production of the National LR *in situ* Inventory. This number should not be duplicated or reassigned to other unit. This number should be composed of the 'National Inventory Code (NICODE 1.1.)' + 'National Inventory Edition Number (1.2.NIENUMB)' + 'Landrace number (3.2. LRNUMB)'

Example: NLD001/201200010

(Note: it is suggested that farmer details (i.e. farmer name, surname, postal address, email address, phone number/s, etc.) are recorded in a separated and not public database. FARMERID should then correspond to FARMERID of the above mentioned separate database to link the two databases).

### 5.2. Farmer year of birth (FARMERYB)

Recorded as YYYY. If not certain, indicate that this is an estimate in REMARKS.

### 5.3. Holding/tenancy of the farm/estate (FARMHT)

See codes in the table below. Multiple choices are allowed since the farm can be made of several types of holdings. Multiple choices are allowed separated by a semicolon (;) without space.

	Code
<b>Owner</b>	<b>10</b>
<b>Tenant</b>	<b>20</b>
<b>Life tenant</b>	<b>30</b>
<b>Cultivating public land</b>	<b>40</b>
<b>Other</b> (elaborate in REMARKS)	<b>99</b>

### 5.4. Farmer identification restrictions\*\* (FIR)

Restriction in making the above mentioned (i.e. 5.2. and 5.3.) farmer data publicly available: 'Yes' or 'No'. If 'No' only FARMERID (5.1) will be public.

	Code
<b>Yes</b>	<b>10</b>
<b>No</b>	<b>20</b>

## 6. THE LANDRACE

### 6.1. Landrace total area (LRTOTAREA) \*

The total area (ha) cultivated under the inventoried LR on that farm as from farmer statement.

### 6.2. Landrace cultivation period (LRCULTPER) \*\*

The length of time the LR was cultivated on that farm as from farmer memory, i.e. cultivated for an unknown number of years, over 50 years, less than 50 years; in the latter case it can be specified the time. See codes in the table below.

	Code		Specific code
<b>Does not answer</b>	<b>10</b>		
<b>Over 50years</b>	<b>20</b>		
<b>Under 50years</b>	<b>30</b>		
		Less than 10 ago	31
		11-25 years ago	32
		26-50 years ago	33

### 6.3. Landrace status (LRSTATUS) \*\*

The status of the LR on that farm, i.e. whether inherent the farm or reintroduced in the farm as from farmer statement. For 'inherent the farm' a cultivation period over 25 years in that farm should be intended. If introduced/reintroduced from other farms it can be specified from where. See codes in the table below. To be eventually elaborated in REMARKS.

	Code		Specific code
<b>Does not answer</b>	<b>10</b>		
<b>Inherent<sup>1)</sup></b>	<b>20</b>		
<b>Reintroduced by the family which presently cultivates the LR from a different estate belonging to the same family<sup>2)</sup></b>	<b>30</b>	Provide details under REMARKS	
<b>Introduced/Reintroduced from gene bank</b>	<b>40</b>		
		Provide Gene Bank name in REMARKS	
<b>Introduced/Reintroduced from other farms</b>	<b>50</b>		
		Neighbouring farm	51
		Farm in the same district	52
		Farm in different district/country	53
<b>Introduced/Reintroduced from the seed market</b>	<b>60</b>		
<b>Other (elaborate in REMARKS)</b>	<b>99</b>		

<sup>1)</sup> should match with LRCULTPER 20 or 33, at least.

<sup>2)</sup> for example: the very same LR has been grown for several decades and generations in the same family at the same farm/garden, but now it is grown at the summer cottage in different district/neighbor house belonging to the same family.

**6.4. Landrace seed/propagation material supply system (LRSSS) \*\***

From where the seed (or propagation material in general) initially came, as from farmer statement. See codes in the table below.

	Code		Specific code
<b>Informal sector</b>	<b>10</b>		
		Own family harvest	11
		Exchanges with relatives, neighbours	12
		Exchanges between close villages via barter system	13
		Local / regional market	14
<b>Formal sector</b>	<b>20</b>		
		Certified material from the seed market	21
		Genebank (to be specified from which genebank in REMARKS)	22
<b>Does not answer</b>	<b>30</b>		
<b>Other</b> (elaborate in REMARKS)	<b>99</b>		

**6.5. Landrace continuity (LRCONT) \***

Whether the LR maintainer plans to continue to grow LR for the foreseeable future. See codes in the table below.

	Code
<b>Undecided</b>	<b>10</b>
<b>Will stop next year</b>	<b>20</b>
<b>Will continue, but considers changing within a few years</b>	<b>30</b>
<b>Will continue as long as possible</b>	<b>40</b>
<b>Other</b> (elaborate in REMARKS)	<b>99</b>

**6.6. Landrace distribution (LRDISTR)**

Whether the LR maintainer plans to give/exchange the LR to/with other growers. If 'Yes', fields related to 'to whom' can be filled in. See codes in the table below.

	Code		Specific code
<b>Yes</b>	<b>10</b>	To whom:	
		relative	11
		friend or neighbour	12
		another grower	13
		seed/seedlings-swap event	14
		plant genebank	15
<b>No</b>	<b>20</b>		
<b>Undecided</b>	<b>30</b>		

**6.7. Farmer motivations for growing the landrace (LRFARMERMOT) \***

Taken from farmer statement. See codes in the table below. Multiple choices are allowed separated by a semicolon (;) without space.

	Code		Specific code		Specific code
<b>Agronomical traits</b>	<b>10</b>				
		Easy/simple cultivation required	11		
		Precocity (early development or maturity)	12		
		Lateness	13		
		Lodging resistance	14		
		High yield	15		
		Stable yield	16		
<b>Resistance to stresses</b>	<b>20</b>				
		Abiotic factors	21		
				cold	211
				drought	212
				high humidity	213
				salinity	214
		Biotic factors	22		
				fungal/bacterial/virus	221
				insect/nematode/etc	222
<b>Cultural and religious motivations</b>	<b>30</b>				
		Personal affection	31		
		Special family food preparations	32		
		Special family ceremonies	33		
		Ritual or religious use of the community	34		
		Local fairs/festivals	35		
		Historical/collector/amateur interest	36		
<b>Quality traits (taste, fragrance, colour, etc.)</b>	<b>40</b>				
<b>Market traits (good storability, easy transformation etc.)</b>	<b>50</b>				
<b>Other (Elaborate in REMARKS)</b>	<b>99</b>				

**6.8. Farmer LR selection criteria (LRFARMERSELCRI)**

The main criteria farmer uses when selecting material for propagation. See codes in the table below.

	<b>Code</b>
<b>Yield</b>	<b>10</b>
<b>Organ size</b>	<b>20</b>
<b>Taste</b>	<b>30</b>
<b>Colour</b>	<b>40</b>
<b>Shape</b>	<b>50</b>
<b>Uniformity</b>	<b>60</b>
<b>Other (Elaborate in REMARKS)</b>	<b>99</b>

**6.9. Part of the plant used (PPU)**

Part/s of the plant used by the farmer, as from farmer statement. See codes in the table below. Multiple choices are allowed separated by a semicolon (;) without space (Bioersity and The Christensen Fund, 2009).

	<b>Code</b>
<b>Entire plant</b>	<b>10</b>
<b>Branch</b>	<b>20</b>
<b>Seedling/germinated seed</b>	<b>30</b>
<b>Gall</b>	<b>40</b>
<b>Stem/trunk</b>	<b>50</b>
<b>Bark</b>	<b>60</b>
<b>Leaf</b>	<b>70</b>
<b>Flower/inflorescence</b>	<b>80</b>
<b>Fruit/infructescence</b>	<b>90</b>
<b>Seed</b>	<b>100</b>
<b>Root/corm</b>	<b>110</b>
<b>Exudate</b>	<b>120</b>
<b>Other (Elaborate in REMARKS)</b>	<b>999</b>

**6.10. Product use (LRPRODUSE) \***

Type of use of the product obtained from the LR: if as direct product or as processed product for larger use, as from farmer statement. See codes in the table below. Multiple choices are allowed separated by a semicolon (;) without space.

	<b>Code</b>		<b>Specific code</b>
<b>As direct product</b>	<b>10</b>		
		Food (e.g. vegetable, soups)	11
		Fodder	12
		Spice - aromatic	13
		Medicinal purpose	14
		Odoriferous purpose	15
		Ornamental purpose	16
<b>As processed product</b>	<b>20</b>		
		Bakery product	21
		Long term storage culinary product (e.g. canned food)	22
		Distillery product	23
		For oil extraction	24
		For textile fibers production	25
<b>Other(elaborate in REMARKS)</b>	<b>99</b>		

**6.11. Main destination of the product (LRPRODEST)**

Where the product from the LR is mainly destined for use, as from farmer statement. See codes in the table below.

	Code		Specific code
<b>Owner's household</b>	<b>10</b>		
<b>Market</b>	<b>20</b>		
		in local market	21
		in district / regional markets	22
		national markets	23
		international sale	24
<b>Other (elaborate in REMARKS)</b>	<b>99</b>		

**6.12. Market landrace demand (LRMARKTDEMAND)**

Demand for LR / LR product as from farmer statement. See codes in the table below.

	Code
<b>Does not answer</b>	<b>10</b>
<b>Strong existing market demand</b>	<b>20</b>
<b>Growing market demand</b>	<b>30</b>
<b>Stable market demand</b>	<b>40</b>
<b>Falling market demand</b>	<b>50</b>
<b>Other (elaborate in REMARKS)</b>	<b>99</b>

**6.13. Loss risk as for the farmer (LRTHREATF)\***

Risk of losing this LR as perceived by the interviewed farmer. It helps to decide if conservation is needed and plan monitoring actions. See codes in the table below.

	Code
<b>Does not answer/know</b>	<b>10</b>
<b>Null / scarce</b>	<b>20</b>
<b>Low</b>	<b>30</b>
<b>Medium</b>	<b>40</b>
<b>High</b>	<b>50</b>
<b>Other (elaborate in REMARKS)</b>	<b>99</b>

**6.14. Loss risk as assessed by the collecting team (LRTHREATCT) \***

Risk of losing this LR as perceived by the team recording data. It helps to decide if conservation is needed and plan monitoring actions. See codes in the table below.

	Code
<b>Unable to judge/assess</b>	<b>10</b>
<b>Null / scarce</b>	<b>20</b>
<b>Low</b>	<b>30</b>
<b>Medium</b>	<b>40</b>
<b>High</b>	<b>50</b>
<b>Other (elaborate in REMARKS)</b>	<b>99</b>

## 7. CONSERVATION AND MONITORING

### 7.1. Conservation actions (CONSERVACTIONS)

Whether any structured and funded *in situ* conservation action related to the LR is in place at the moment of the Inventory compilation. See codes in the table below.

	Code		Specific code
<b>Yes</b>	<b>10</b>		
		Policy-based actions	11
		Educational actions (didactic gardens, living museum etc.)	12
		Other (To be specified in REMARKS)	99
<b>No</b>	<b>20</b>		
<b>Unknown</b>	<b>30</b>		

### 7.2. Conservation organiser (CONORG)

To be compiled if CONSERVACTIONS is 'Yes'. Name of the Authority/Public subject/Farmer organisation/Foundation that has organised the conservation action. Free text.

### 7.3. Monitoring (MONIT)

Whether any monitoring of the *in situ* maintenance of LR is foreseen across years. Yes or No.

	Code
<b>Yes</b>	<b>10</b>
<b>No</b>	<b>20</b>

### 7.4. Monitoring responsible (MONITRESP)

To be compiled if MONIT is 'Yes'. Indicate who is in charge of monitoring. Free text.

### 7.5. Monitoring interval (MONINT)

To be compiled if MONIT is 'Yes'. Indicate the monitoring interval in years.

### 7.6. Safety duplication *ex situ* (EXSECURE) \*

State if a sample was collected for safety duplication in gene bank. Yes or No.

	Code
<b>Yes</b>	<b>10</b>
<b>No</b>	<b>20</b>

### 7.7. Location of *ex situ* duplicate/s (EXDUPL) \*

To be filled in if the answer of EXSECURE (7.6) is 'Yes'. FAO WIEWS institute code/s of the institute/s where an *ex situ* safety duplicate of the landrace has been eventually deposited. The codes consist of the 3-letter ISO 3166 country code of the country where the institute is located plus a number. Multiple codes are separated by a semicolon (;) without space.



## 8. REMARKS

The remarks field is used to add notes or to elaborate on descriptors with value 99 or 999 (=Other). Prefix remarks with the field name they refer to and make them follow by a colon (:). Distinct remarks referring to different fields are separated by semicolons (;) without space.

Examples: The farmer often observes flower colour instability; PRODUCTUSE: chaff also used for fuel pellet and pillow filling; LRMARKTDEMAND: falling locally but growing in the district nearby.

## Cited bibliography

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