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COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

CROPS PROPOSED FOR THE MULTILATERAL SYSTEM: CENTRES OF DIVERSITY, LOCATIONS OF *EX SITU* COLLECTIONS, AND MAJOR PRODUCING COUNTRIES

The document was prepared by IPGRI at the request of the Secretariat of the Commission on Genetic Resources for Food and Agriculture in order to facilitate the negotiations for the revision of the International Undertaking, in harmony with the Convention on Biological Diversity. It is an updated and expanded version of the draft document made available to the Fourth Inter-Sessional Meeting of the Contact Group.

CONTENTS

CROPS PROPOSED FOR THE MULTILATERAL SYSTEM: CENTRES OF DIVERSITY, LOCATIONS OF *EX SITU* COLLECTIONS, AND MAJOR PRODUCING COUNTRIES

1. INTRODUCTION

This document provides information on crops being proposed by various regions for inclusion in the multilateral system that will be established through the revised International Undertaking. Regions have suggested a total of a little over 300 crops. While most of these crop genepools, properly defined, contain multiple species, the total still represents a minute portion of the world's plant species, and a tiny fraction of those that are or have been used by human beings. Approximately 500,000 plant species are thought to exist; 250-300,000 have been identified and described (Mayr, 1976; Heywood, 1995). Some 30,000 are edible (Wilson, 1992). Of these, E.O. Wilson estimates that 7,000 have been cultivated or collected at some point in history, but this figure may actually be too modest. In 1936, the US Department of Agriculture listed more than 1,100 species of food plants used just by native peoples in North America, and Felger and Nabhan estimated that the total number was actually between 3,000 and 5,000 (Nabhan, 1982). This document, therefore, covers a small subset of the plant species that have been used for food and an even smaller subset of those that are edible and those of potential use.

The portion of this document that provides information about primary and secondary areas of diversity is based upon the standard reference, Dictionary of Cultivated Plants and Their Regions of Diversity, by A.C. Zeven and J.M.J. de Wet (1982) and it refers to regions of crop genepool diversity and not to individual crop species diversity.

In the tradition of Vavilov, Zeven and de Wet identify certain "centres", which unfortunately in the context of the present exercise do not correspond precisely to "regions" as used at FAO. In several cases, Zeven and de Wet's centres either encompass several FAO regions, or only a part of a single FAO region. For example, the Mediterranean centre includes parts of Africa, the Near East and Europe. Except where specific information suggests a particular region, crops from this centre are allocated in the Table to all three FAO regions. In contrast, Zeven and de Wet's African centre excludes several countries that are part of the FAO Africa region. Readers should take this fact into account. In some cases, Zeven and de Wet do not identify a centre for a crop, and thus, either none is listed in the Table or the information provided comes from the list of cultivated species Mansfeld produced that is currently being updated and made available in an electronic form (Mansfeld, 1986).

The implications for policy of Zeven and de Wet's work should be tempered by a number of considerations. First, as stated above, their centres are not identical to FAO's regions. Moreover, identifying an area of diversity is not the same as identifying a centre of origin, much less a "country of origin." This latter term has a certain legal meaning in the Convention on Biological Diversity (CBD). Pinpointing a crop's area of diversity (and thus, perhaps, its origin) may not suffice in meeting the CBD's requirement for identifying were species and/or "distinctive properties" first arose (Fowler, 2000). Vavilov, Zeven and de Wet and others, in their employment of the concept of "centres," were more interested in a *crop's* diversity or origins, which may not be quite the same as a *species,* let alone a crop genepool. Moreover, centres of diversity are somewhat artificial constructs, being frequently an amalgamation of centres for individual crops. Thus, saying that a region is the centre for diversity of a particular crop does not mean that

diversity was concentrated in the entire region; historically it may only have been found in part of the region.

The distinction between primary and secondary areas of diversity is not related to the *amount* of diversity found in either. The distinction has more to do with sequences in the development of agriculture, secondary areas generally being those where diversity arose at a later date, usually after the domestication had already taken place in the primary area, which in many cases may still be thousands of years ago. These secondary areas may include the natural range of a plant, but more typically are on the edge of or are outside the primary centre.

It should be noted that the Vavilov concept of centres has been both modified and challenged over time. Different authors have proposed different numbers and locations of centres – even Vavilov did this during his lifetime. Harlan (1971) spoke of centres and "non-centres" and observed that some Vavilovian centres are so enormous as to render the term "centre" almost meaningless. Zhukovsky (1968), noting that so many crops originated outside Vavilov's centres, proposed the notion of "megagene centres", but these centres "engulf much of the world's land surface and adjoin over great distances" (Zeven and Zhukovsky, 1975).

By definition, Zeven and de Wet provide a snapshot of where diversity was found at a certain time or during a certain period. Historic centres of diversity and regions where particular crops were domesticated can be identified in many, even most, cases. To a large extent, Zeven and de Wet's work synthesizes what was known about this in the early 1980s. A more up-to-date (and accurate) treatment of this subject would require one to examine the substantial body of work that has been published since 1982. As this would involve numerous sources and require considerable time, it was beyond the scope of this endeavour. It should be understood, however, that in a number of cases, an updating of Zeven and de Wet would result in corrections or amplifications being made to the text relied upon for this document. Moreover, one might expect that changes and corrections will continue to be made into the foreseeable future. The "science" involved in these matters is not an exact one, and the data available – particularly about events that took place thousands of years ago – are less than complete. Even the genetic evidence is often subject to interpretation, and disagreements among experts continue to arise.

Zeven and de Wet's work is perhaps the best single source for constructing a table such as the one provided here. Nevertheless, it has certain specific technical limitations that reduce its usefulness for the current exercise. For example, the way in which their regions are drawn/constituted would appear to be highly influenced by political borders. This can be illustrated by their North America centre that curiously seems to be influenced by the US-Canada and US-Mexico political borders.

More importantly, perhaps, their work, published almost twenty years ago, cannot be used with precision to inform us about whether a certain area or region has or does not have large amounts of genetic diversity *today*. We assume that to the extent diversity exists *in situ*, it can be found mainly in primary and secondary areas. Both, genetic erosion and evolution continue, however, some erosion being an entirely "natural" aspect of evolution. Diversity has no fixed address. New forms and combinations, some the result of mutations and others the product of selection and breeding, can arise wherever a crop is grown, regardless of where it was domesticated. This fact explains the existence of "secondary areas" (noted in the Table below), as well as the phenomena of new forms arising outside defined centres. The point is that the process is dynamic.
In some crops, only a fraction of the diversity once present in a centre can be found today *in situ* in that centre. Harlan noted the "disappearance" of "microcentres" of wheat diversity in Turkey, for instance. Erna Bennett, one of the pioneers of modern genetic conservation efforts, was once moved to observe that we may need to think of some centres as "former centres" and begin thinking about certain genebanks as additional centres of diversity today.

Because of the impact of genetic erosion, particularly in the past century as a result of the spread of "modern" agriculture and crop varieties, and the fact that a large amount of genetic resources is now conserved exclusively in genebanks, we have elected to supplement the Table on centres of diversity with information on *ex situ* germplasm collection holdings per country and per individual crop genepool. The IPGRI Germplasm Holdings Database is the main source for this column in the table below. In addition, we list the five main producing countries of crop genepools for which these data were available. This information is taken from FAOSTAT. Finally, we provide an estimate of the percentage of existing diversity that can be found in *ex situ* collections. These estimates were made by crop experts and were reported in the FAO State of the World's Plant Genetic Resources. The estimates provide an indicative figure at best, and are available for only a few crop genepools.

The "**Table on genepools for suggested crops for the multilateral system and their centres of diversity**" displays information on each suggested crop according to the following categories:

- Common name and genus.
- FAO regions that suggested the inclusion of each crop.
- Centres of origin/diversification of each crop as identified by pioneering scientist N. I. Vavilov (Vavilovian centres):

1. Chinese-Japanese	7. Mediterranean
2. Indochinese-Indonesian	8. African
3. Australian	9. European-Siberian
4. Hindustani	10. South American
5. Central Asian	11. Central American and Mexican
6. Near Eastern	12. North American

- FAO regions that include at least part of an area of diversity for each crop, as follows:

  p: primary area of diversity
  s: secondary area of diversity
  ps: primary area of diversity and at least a secondary area of diversity.

- Major countries producing each crop (in percentage of world production).
- Major countries holding *ex situ* collections of each crop.
- Estimation of percentage of germplasm that is held in collections for each crop.

➢ *See notes to the table at the end of document for further details. Notes to column headings are referred as [A] to [F]. Notes to crops' data are referred as [1] to [43].*

Table on genepools for suggested crops for the Multilateral System and their centres of diversity

	CROPS SUGGESTED BY:							REGIONS OF DIVERSITY [A]									
Common name [B]	**Genus**	**European Countries**	**African Countries**	**Asian Countries**	**Latin American & Caribbean Countr.**	**North American Countries**	**Vavilovian Centres** [C]	**European Region**	**African Region**	**Asian Region**	**Near Eastern Region**	**Latin American & Caribbean Region**	**North American Region**	**Pacific Region**	**Percentage of World Production** [D]	**Germplasm holdings** [E]	**% Germplasm in collections** [F]
Acerola	*Malpighia*	X					10,11					p				BRA(70) GUY(13) USA(6) FRA(4) MEX(3)	
Agave	*Furcraea*	X					10,11 (8)		s			p			COL(41) CUB(21) MEX(17) NIC(8) PHL(7) *[1]*	CUB(100)	
Alfalfa *[43]*	*Medicago*	X				X	5,6,7,9	p	p	p	p					AUS(21) SYR(16) USA(13) FRA(7) RUS(6)	
Allspice	*Pimenta*	X					2,11			p		p			IND(41) CHN(10) PAK(6) ETH(6) VNM(4) *[2]*	BRA(60) JAM(10) HND(8) CRI(8) USA(8)	
Amaranth	*Amaranthus*	X					10,11 (2,4)			s		p				USA(32) PER(24) IND(7) MEX(6) CHN(4)	
American grapevine	*Muscadinia*	X															
Anise	*Pimpinella*	X					6				p				IND(37) MEX(11) CHN(9) MAR(8) EGY(7) *[3]*	TUR(43) DEU(26) USA(10) BGR(5) CZE(4)	
Añu	*Tropaeolum*	X					10					p				PER(86) ECU(6) BOL(5) COL(2) DEU(1)	
Apple	*Malus*	X			X		5,9 (1,6)	p		ps	s				CHN(37) USA(8) FRA(4) TUR(4) ITA(4)	CHN(33) CAN(14) SWE(10) USA(5) ITA(5)	
Arbutus	*Myrica*	X					1			p						USA(50) TWN(30) GBR(20)	
Arracacha	*Arracacia*	X					10					p				PER(56) BRA(22) ECU(11) COL(9) BOL(2)	
Arrowroot	*Maranta*	X					10					p				IND(48) PHL(39) VNM(5) IDN(2) USA(1)	
Arrowroot	*Tacca*	X					2			p							

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Artichoke, cardoon	*Cynara*	X					7	p	p		p				ITA(38) ESP(23) ARG(7) FRA(6) EGY(5) *[4]*	ITA(31) USA(21) FRA(19) CHL(8) ESP(7)	
Asparagus	*Asparagus*	X					9	p							CHN(81) PER(5) USA(2) JPN(2) MEX(2)	FRA(58) USA(28) POL(5) CHL(3) BRA(2)	
Avocado	*Persea*	X					10,11					p			MEX(41) USA(7) IDN(5) CHL(4) BRA(3)	USA(13) BRA(12) MEX(11) CUB(8) THA(8)	
Azarole	*Crataegus*	X					1,5,6,7	p	p	p	p					SWE(71) FRA(16) USA(4) HUN(2) NLD(2)	
Balsam apple	*Momordica*	X														PHL(28) THA(26) CHN(17) LKA(6) USA(6)	
Banana, plantain	*Musa*	X		X	X	X	2,3,4(8,10)		s	p		s		p	separate commodities in FAOSTAT *[5]*	IND(9) BEL(8) FRA(7) HND(7) PNG(7)	80% cult. 20% wild
Barley	*Hordeum*	X		X	X	X	6 (1,7)	s	s	s	p				CAN (11) RUS(9) DEU(9) ESP(8) FRA(7)	CAN(17) GBR(8) USA(8) SYR(7) DEU(6)	
Basil	*Ocimum*	X					2,8		p	p						RUS(26) DEU(24) USA(12) CZE(9) FRA(7)	
Beans	*Phaseolus*	X	X		X	X	10,11 (2,3,4)		s	s		p			IND(23) BRA(16) CHN(10) MMR(6) USA(6) *[6]*	COL(15) MEX(14) BRA(10) USA(9) DEU(4)	60% cult. 40% wild
Beet, beetroot *[43]*	*Beta*	X				X	4,6,7,9 (5)	p	p	s	p				USA(12) FRA(12) DEU(11) TUR(8) RUS(6) *[7]*	USA(26) DEU(21) FRA(10) YUG(8) RUS(6)	
Black cummin	*Nigella*	X					7,9	p	p		p					RUS(31) DEU(21) ETH(14) TUR(10) GBR(9)	
Black salsify	*Scorzonera*	X					7	s	p		p					FRA(29) POL(16) BEL(13) SWE(13) DEU(8)	

Table on genepools for suggested crops for the Multilateral System and their centres of diversity

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Blueberry, cranberry	*Vaccinium*	X					12						p		separate commodities in FAOSTAT *[8]*	SWE(69) USA(24) CAN(3) POL(1) LTU(1)	
Borage	*Borago*	X					2,7	p	p	p	p					ESP(36) PRT(29) CZE(15) DEU(9) GRC(6)	
Bottle gourd	*Lagenaria*	X					8		p							USA(36) CRI(12) PHL(11) DEU(3) ESP(3)	
Buckwheat	*Fagopyrum*	X					1,6			p	p				CHN(59) RUS(23) UKR(8) USA(2) BRA(2)	CHN(28) RUS(23) UKR(14) CAN(11) JPN(5)	
Cabbage, rape, mustard, turnip *[43]*	*Brassica*	X		X	X	X	1,4,5,6,7,8,9,10	p	p	p	p				CHN(38) IND(8) RUS(6) KOR(6) JPN(5) *[9]*	CHN(22) IND(16) DEU(11) GBR(7) USA(7)	
Caper	*Capparis*	X					7	p	p		p					TUR(87) DEU(3) ROM(3) USA(3) VEN(3)	
Capsicum pepper	*Capsicum*	X					4,9,10,11	s		s		p			CHN(42) MEX(10) TUR(8) ESP(5) NGA(4) *[10]*	MEX(23) TWN(13) USA(8) BGR(8) HUN(4)	
Carambola, bilimbi	*Averrhoa*	X					2			p						BRA(30) USA(21) ISR(10) PHL(8) TWN(6)	
Caraway	*Carum*	X					4,7,9	p	p	p	p					CZE(70) DEU(7) TUR(5) POL(4) ETH(3)	
Cardamom	*Elettaria*	X					4			p					IDN(30) GTM(26) IND(14) BTN(9) NPL(7) *[11]*	CRI(80) USA(20)	
Carob	*Ceratonia*	X					7	p	p		p				ESP(49) ITA(17) MAR(9) PRT(8) GRC(7)	ESP(55) TUR(41) ETH(2) USA(2) GBR(1)	
Carrot	*Daucus*	X					5,6,7,9	s	s	p	p				CHN(25) USA(12) RUS(7) POL(5) GBR(4)	RUS(29) GBR(16) USA(13) CZE(8) FRA(7)	

Table on genepools for suggested crops for the Multilateral System and their centres of diversity

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Common name [B]	**Genus**	**European Countries**	**African Countries**	**Asian Countries**	**Latin American & Caribbean Countr.**	**North American Countries**	**Vavilovian Centres** [C]	**European Region**	**African Region**	**Asian Region**	**Near Eastern Region**	**Latin American & Caribbean Region**	**North American Region**	**Pacific Region**	**Percentage of World Production** [D]	**Germplasm holdings** [E]	**% Germplasm in collections** [F]
Cassava	*Manihot*	X	X		X	X	2,8,10,11		s	s		p			NGA(19) BRA(13) THA(11) COG(9) IDN(9)	BRA(28) COL(20) NGA(12) IND(5) UGA(5)	35% cult. 5% wild
Castor bean	*Ricinus*	X					8		p						IND(65) CHN(17) BRA(11) PRY(1) ETH(1)	CHN(43) BRA(13) RUS(13) USA(12) IND(4)	
Celery, celeriac	*Apium*	X					7,9	p	p		p					USA(22) RUS(18) DEU(14) GBR(11) CZE(9)	
Chayote	*Sechium*	X					11					p				MEX(58) CI(41) USA(1)	
Cherimoya, soursop	*Annona*	X					10,11					p				USA(24) VRA(17) ECU(17) CRI(8) PHL(6)	
Chervil	*Anthriscus*	X					9	p								DEU(80) GBR(13) SWE(6) ROM(2)	
Chestnut	*Castanea*	X					1,6,12	p		p	p		p		KOR(22) CHN(22) ITA(15) TUR(13) BOL(6)	ESP(35) FRA(34) PRT(9) CHE(8) ROM(4)	
Chickpea	*Cicer*	X		X		X	4,5,6,7	s	p	s	p				IND(71) PAK(7) TUR(6) MEX(2) IRN(2)	IND(32) SYR(17) USA(8) PAK(5) AUS(4)	80%
Chicory, endive	*Cichorium*	X					7,9	p	p	p	p				BEL-LUX(70) FRA(21) POL(4) ZAF(3) ESP(1) *[12]*	FRA(40) DEU(22) USA(18) ESP(3) CHE(3)	
Chufa	*Cyperus*	X					1,7	p	p	p	p					ETH(31) GBR(31) DEU(15) BFA(8) CHE(8)	
Cinnamon	*Cinnamomum*	X					1,2,4			p					IDN(44) CHN(35) LKA(13) VNM(5) MDG(2)	HND(38) USA(33) CRI(8) FRA(8) ECU(4)	
Citrus	*Citrus*	X		X	X	X	1,2,4,6,7,11	s		p	p	p			BRA(23) USA(15) CHN(11) ESP(5) MEX(5)	BRA(21) FRA(9) USA(8) JPN(5) CHN(5)	
Clover *[43]*	*Trifolium*	X		X		X	3,6,7,8,9	p	p	s	p			p		AUS(17) NZL(14) USA(11) RUS(9) ESP(7)	

Table on genepools for suggested crops for the Multilateral System and their centres of diversity

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Cocoa	*Theobroma*	X					10,11					p			CIV(41) GHA(13) IDN(11) NGA(7) BRA(7) *[13]*	BRA(30) TTO(18) ECU(10) COL(10) VEN(9)	
Coconut	*Cocos*	X		X	X	X	2,4			ps					IDN(27) IND(23) PHL(23) LKA(4) BRA(4)	VEN(42) PHL(9) SLE(9) FRA(7) IND(6)	
Coriander	*Coriandrum*	X					7	p	p		p					RUS(42) DEU(17) CHN(12) USA(7) ETH(4)	
Cork oak, sweet acorn oak	*Quercus*	X					1,7	p	p	p	p					FRA(96) USA(1) CZE(1) NLD(1) HUN(1)	
Cornel cherry	*Cornus*	X					6				p					USA(47) ROM(19) UKR(13) CZE(7) HUN(7)	
Cornsalad	*Valeriana*	X					7,9,12	p	p		p		p			SWE(78) FRA(6) DEU(4) BEL(3) AUT(3)	
Cotton	*Gossypium*	X				X	1,2,5,8,10,11,12		p	p		p	p		CHN(21) USA(19) IND(11) PAK(11) UZB(7) *[14]*	IND(29) USA(16) FRA(10) RUS(9) CHN(9)	
Cowpea	*Vigna*	X			X	X	2,3,4,8		p	ps				p	NGA(64) NER(20) MLI(3) MMR(3) UGA(2) *[15]*	NGA(20) CHN(14) USA(13) PHL(10) BRA(8)	
Crambe, sea kale	*Crambe*	X					6,7,9	p	p		p					USA(50) DEU(16) AUS(12) RUS(8) SWE(5)	
Cress	*Barbarea*	X					9	p								SWE(91) DEU(8) USA(1)	
Cress, maca	*Lepidium*	X					7,8,10	p	p		p	p				RUS(36) DEU(16) USA(12) PER(11) TUR(7)	
Cucumber	*Cucumis*	X					1,4,5,6,8		p	ps	p				CHN(57) IRN(5) TUR(5) USA(4) JPN(3) *[16}*	RUS(17) USA(16) ESP(12) CHN(11) FRA(8)	
Cumin	*Cuminum*	X					5,6,7	p	p	p	p					PAK(51) DEU(31) ETH(5) SDN(5) GRC(2)	

Table on genepools for suggested crops for the Multilateral System and their centres of diversity

	CROPS SUGGESTED BY:							REGIONS OF DIVERSITY [A]									
Common name [B]	**Genus**	**European Countries**	**African Countries**	**Asian Countries**	**Latin American & Caribbean Countr.**	**North American Countries**	**Vavilovian Centres** [C]	**European Region**	**African Region**	**Asian Region**	**Near Eastern Region**	**Latin American & Caribbean Region**	**North American Region**	**Pacific Region**	**Percentage of World Production** [D]	**Germplasm holdings** [E]	**% Germplasm in collections** [F]
Dandelion	*Taraxacum*	X					5,9	p		p						DEU(42) USA(25) POL(17) GBR(8) ROM(8)	
Date palm	*Phoenix*	X					8		p	s					IRN(18) EGY(16) SAU(12) PAK(11) IRQ(10)	DZA(27) BRA(22) NGA(20) IRQ(12) USA(11)	
Dill	*Anethum*	X					4,7	p	p	p	p					RUS(55) DEU(15) USA(11) SDN(4) CZE(3)	
Durian	*Durio*	X					2			p						THA(70) MYS(9) IDN(9) PHL(8) USA(2)	
Eggplant, naranjilla	*Solanum*	X					1,4,8/10		p	p		p			CHN(54) IND(28) TUR(4) EGY(3) JPN(2)	CHN(24) USA(12) RUS(11) PHL(10) FRA(10) *[17]*	
Elder	*Sambucus*	X					9	p								SWE(45) USA(33) HUN(8) CHE(4) SVK(2)	
Evening primrose	*Oenothera*	X					11			p						USA(41) GBR(39) DEU11) AUS(3) CAN(3)	
Faba bean	*Vicia*	X				X	1,5,6,7,9,10,12	p	p	p	p	p	p		CHN(55) EGY(12) ETH(7) AUS(5) MAR(3) *[18]*	SYR(23) DEU(10) ESP(8) CHN(6) ITA(6)	
Feijoa = Pineapple guava	*Acca = Feijoa*	X					10			p						BRA(66) ITA(11) ZAF(6) PRT(3) AUS(2)	
Fennel	*Foeniculum*	X					7	p	p		p				IND(37) MEX(11) CHN(9) MAR(8) EGY(7) *[19]*	RUS(26) DEU(24) FRA(10) CHE(8) USA(8)	
Fenugreek *[43]*	*Trigonella*	X				X	6,9	p			p					ETH(18) SYR(17) AUS(14) USA(12) DEU(7)	
Fescue *[43]*	*Festuca*	X				X	9, 10	p				p				POL(34) JPN(16) USA(9) DEU(8) GBR(6)	

Table on genepools for suggested crops for the Multilateral System and their centres of diversity

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Fig	*Ficus*	X					4,6,7,8	p	p	p	p				TUR(23) EGY(19) GRC(7) MAR(7) IRN(7)	SYR(19) USA(19) ESP(15) TUR(12) ITA(10)	
Finger millet	*Eleusine*	X	X	X		X	4,8		p	p						IND(48) KEN(16) USA(10) UGA(8) ETH(6)	
Flax	*Linum*	X				X	4,5,6,7,8,9	s	p	p	p				CHN(34) FRA(17) BLR(10) RUS(8) GBR(8) *[20]*	RUS(16) CHN(15) ROM(11) ETH(10) DEU(9)	
Fonio millet	*Digitaria*	X				X	4,8,9,12	p	p	p			p		GIN(47) NGA(29) MLI(9) BFA(8) COV(6)	USA(28) KEN(19) AUS(14) FRA(10) GIN(9)	
Foxtail millet	*Setaria*	X		X		X	1,8,12		p	p			p			CHN(60) RUS(11) FRA(10) IND(7) KEN(3)	
Gamba *[43]*	*Andropogon*	X				X	2,4,7,8	p	p	p	p					USA(67) COL(9) KEN(8) AUS(6) CAN(3)	
Ginger	*Zingiber*	X					(1,2) 4			p					IND(34) CHN(23) NGA(13) IDN(11) BGD(6)	IND(66) ETH(13) PHL(11) NGA(4) ECU(3)	
Ginseng	*Panax*	X					1,2,12			p			p				
Gobo	*Arctium*	X					1,9	p		p						DEU(42) CHN(28) POL(11) GBR(8) BRA(3)	
Gold of pleasure	*Camelina*	X					6				p					RUS(44) DEU(40) BGR(7) USA(6) CZE(2)	
Grapes	*Vitis*	X			X		1,5,6,7,12	p	p	p	p		p		ITA(16) FRA(13) USA(11) ESP(9) TUR(6) *[21]*	FRA(27) ESP(14) USA(8) HUN(8) BRA(6)	
Guava	*Psidium*	X					10,11					p				BRA(24) SLE(12) CUB(9) IND(7) USA(7)	
Hazelnut	*Corylus*	X					1,6,7	p	p	p	p				TUR(74) ITA(15) USA(3) ESP(2) CHN(2)	ITA(48) USA(18) UKR(7) ESP(4) RUS(4)	

Table on genepools for suggested crops for the Multilateral System and their centres of diversity

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Heart of palm	*Acrocomia*	X										p				USA(91) HND(9)	
Hemp	*Cannabis*	X					1,4,9	p		p					CHN(32) KOR(16) ROM(11) ESP(9) RUS(7) *[22]*	UKR(50) CHN(22) ROM(13) HUN(6) TUR(4)	
Hop	*Humulus*	X					1,9,12	p		p			p		DEU(32) USA(30) CHN(14) CZE(4) GBR(3)	USA(34) GBR(21) CZE(9) UKR(9) YUG(7)	
Horseradish	*Armoracia*	X					9	p								CZE(54.5) DNK(45.5)	
Hyssop	*Hyssopus*	X					7	p	p		p					FRA(27) DEU(26) CZE(18) USA(11) SVK(5)	
Ivy gourd	*Coccinia*	X					4,8		p	p						ETH(65) USA(21) LKA(7) IND(5) GBR(2)	
Japanese artichoke	*Stachys*	X					1			p						DEU(57) TUR(20) GBR(12) USA(6) CHE(4)	
Japanese millet	*Echinochloa*	X					1,4,8		p	p						IND(49) JPN(19) KEN(10) CHN(5) RUS(4)	
Japanese quince	*Chaenomeles*	X					1			p						SWE(99) LTU(1)	
Jaragua ***[43]***	*Hyparrhenia*	X				X	8		p							KEN(49) COL(21) USA(13) AUS(9) ETH(4)	
Jerusalem artichoke	*Helianthus*	X					9,12	p					p			ROM(20) YUG(16) FRA(12) USA(11) RUS(9)	
Job's tears	*Coix*	X					2			p						CHN(75) PHL(9) DEU(8) THA(3) CRI(1)	
Jujube	*Ziziphus*	X					1,7	p	p		p					IND(55) BFA(14) USA(6) TWN(5) GBR(3)	
Kangkong	*Ipomoea*	X					1,2,4,11			p		p				PER(23) JPN(11) USA(10) CHN(9) PHL(7)	

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Kenaf, roselle	*Hibiscus*	X					1,4,8		p	p						BGD(35) USA(19) AUS(11) CHN(11) EGY(5)	
Kiwifruit	*Actinidia*	X					1			p					ITA(31) NZL(26) CHL(17) FRA(9) GRC(5)	NZL(33) RUS(16) FRA(10) USA(8) CHE(5)	
Kodo millet ***[43]***	*Paspalum*	X				X	1,2,4,10,12			p		p	p			USA(28) IND(26) BRA(14) AUS(5) URY(5)	
Kumquat	*Fortunella*	X					1,2			p						USA(18) BRA(12) CHN(12) JPN(10) FRA(8)	
Laurel, bay leaf	*Laurus*	X					7	p	p	p						PRT(50) USA(50)	
Lentils	*Lens*	X		X	X	X	6		p	s	p				IND(28) CAN(22) TUR(18) BGD(5) NPL(4)	SYR(29) USA(9) RUS(8) CHL(7) AUS(6)	
Lettuce	*Lactuca*	X					1,7,8,9	p	p	p	p				CHN(37) USA(25) ESP(6) ITA(6) IND(5)	USA(16) NLD(15) FRA(12) RUS(7) CZE(7)	
Licorice	*Glycyrrhiza*	X					7,9	p	p		p					RUS(39) USA(28) DEU(24) CHN(7) ESP(1)	
Linseed	*Linum*	X					4,5,6,7,8,9	s	p	p	p				CAN(26) CHN(20) DEU(12) GBR(10) USA(10)	RUS(16) CHN(15) ROM(11) ETH(10) DEU(9)	
Litchi	*Litchi*	X					1			p						USA(27) CHN(18) ISR(9) THA(9) TWN(7)	
Longan	*Dimocarpus = Litchi*	X					1			p						CHN(56) USA(17) TWN(14) THA(5) AUS(3)	
Loquat	*Eriobotrya*	X					1			p						CHN(67) USA(13) ITA(8) PRT(6) TZA(3)	
Lovage	*Levisticum*	X					9	p								DEU(61) CZE(14) POL(7) SVK(7) LTU(4)	

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Lupine, tarwi *[43]*	*Lupinus*	X				X	3,7,10,12	p	p		p	p	p	p	AUS(82) POL(4) ZAF(2) CHL(2) FRA(2) *[23]*	PER(18) ESP(17) DEU(10) AUS(10) FRA(9)	
Macadamia	*Macadamia*	X					3							p		BRA(17) USA(17) AUS(16) CRI(10) ISR(8)	
Maize	*Zea*	X	X	X	X	X	1,2,4,6,7,8,9,10,11,12	s	s	s	s	ps	s		USA(44) CHN(17) BRA(5) MEX(3) FRA(3) *[24]*	MEX(19) IND(10) RUS(7) COL(6) CHN(6)	95% cult. 15% wild
Mallow	*Malva*	X					1			p						DEU(40) CHN(25) USA(22) ROM(3) GRC(2)	
Mamey	*Mammea*	X					10					p				GTM(31) CRI(23) USA(13) SLV(10) BRA(8)	
Mango	*Mangifera*	X					2,4,12			p			p		IND(49) CHN(10) MEX(6) THA(5) PAK(4)	BRA(16) IND(15) PHL(7) CUB(6) USA(5)	
Mangosteen, false kola nut	*Garcinia*	X					2,4			p						THA(84) USA(4) HND(2) MEX(2) PHL(2)	
Manna	*Glyceria*	X					9	p								DEU(46) USA(46) GBR(9)	
Marjoram	*Majorana = Origanu*	X					7,9	p	p	p						CZE((42) DEU(32) SVK(16) LTU(11)	
Meadow foxtail *[43]*	*Alopecurus*	X				X	9	p								RUS(43) USA(26) GBR(11) DEU(5) TUR(4)	
Meadow grass, blue grass *[43]*	*Poa*	X				X	6,9,12	p			p		p			POL(39) RUS(18) DEU(10) USA(10) NZL(5)	
Medlar	*Mespilus*	X					6,9	p			p					HUN(47) USA(29) GBR(8) CHE(6) NLD(4)	
Melon	*Cucumis*	X				X	1,4,5,6,8		p	p	s				CHN(34) TUR(9) USA(7) IRN(6) ESP(6) *[25]*	RUS(17) USA(16) ESP(12) CHN(11) FRA(8)	

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Mint	*Mentha*	X					1,7,9,12	p	p	p			p			USA(50) DEU(16) BEL(10) PRT(9) FRA(6)	
Mulberry	*Morus*	X					1,5			p						FRA(49) VNM(34) USA(7) CAN(2) UGA(2)	
Mustard	*Sinapis*	X					7,8,9	p	p		p				CAN(49) NPL(20) RUS(12) CZE(7) USA(3)	DEU(26) RUS(16) BGR(13) CAN(9) AUS(8)	
New-Zealand spinach	*Tetragonia*	X					1			p						DEU(46) USA(23) ESP(18) CZE(9) ETH(5)	
Noug	*Guizotia*	X					8		p							ETH(63) IND(30) NPL(4) USA(2) AUS(1)	
Oat	*Avena*	X		X	X	X	1,6,7,8,9	p	p	p	p				RUS(20) CAN(14) USA(8) AUS(5) FIN(5)	CAN(33) USA(15) RUS(9) KEN(9) ISR(4)	
Oatgrass ***[43]***	*Arrhenatherum*	X				X	9	p								USA(42) RUS(33) BRA(6) DEU(5) HUN(4)	
Oca	*Oxalis*	X					10					p				PER(88) BOL(8) ECU(3)	
Oil palm	*Elaeis*	X			X	X	8,10		p			p			MYS(43) IDN(30) NGA(8) THA(3) COL(3) *[26]*	ZAR(82) MYS(10) BRA(3) COL(2) SLE(1)	
Okra	*Abelmoschus*	X					1,4,8		p	p					IND(64) NGA(19) GHA(4) PAK(3) EGY(2)	USA(32) CIV(13) PHL(13) FRA(9) IND(8)	
Olive	*Olea*	X			X		7		p	p					ESP(27) ITA(24) GRC(14) TUN(7) SYR(6)	ESP(30) FRA(13) USA(12) PRT(11) GRC(10)	
Onion, leek, garlic	*Allium*	X			X	X	1,4,5,6,7,9	p	s	p	p				separate commodities in FAOSTAT *[27]*	DEU(20) USA(9) GBR(8) IND(8) HUN(6)	
Orach	*Atriplex*	X					3,9,12	p					p	p		AUS(47) KEN(12) HUN(7) DEU(6) MAR(6)	

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Orchard grass *[43]*	*Dactylis*	X				X	9	p								POL(38) JPN(21) DEU(8) USA(5) GBR(4)	
Oregano	*Origanum*	X					7,9	p	p	p						TUR(36) FRA(29) CZE(11) DEU(8) GRC(6)	
Papaya	*Carica*	X					10,11					p			BRA(32) NGA(14) MEX(12) IND(8) IDN(7)	BRA(15) PHL(14) IND(12) ECU(10) USA(9)	
Para *[43]*	*Brachiaria*	X				X	8		p							COL(46) BRA(21) KEN(12) AUS(6) ETH(5)	
Parsley	*Petroselinum*	X					7	p								USA(19) DEU(14) RUS(12) ESP(11) TUR(9)	
Parsnip	*Pastinaca*	X					9	p								DEU(26) RUS(24) USA(24) GBR(11) CZE(7)	
Passion fruit	*Passiflora*	X					10,11,12					p	p			BRA(27) ECU(25) USA(18) PER(12) COL(7)	
Pea	*Pisum*	X		X	X	X	6,7,8,10	s	p		p	p			CAN(25) FRA(17) CHN(11) RUS(6) UKR(5) *[28]*	USA(9) GBR(9) RUS(9) SWE(6) ITA(6)	
Peach, almond, cherry, plum, apricot	*Prunus*	X			X		1,5,6,7,9,12	p		p	p		p		separate commodities in FAOSTAT *[29]*	USA(17) ITA(12) SWE(11) UKR(7) FRA(6)	
Peanut = groundnut *[43]*	*Arachis*	X		X		X	8,10		p			p			CHN(37) IND(20) NGA(9) USA(5) IDN(3) *[30]*	IND(35) USA(18) CHN(15) ARG(7) BRA(3)	
Pear	*Pyrus*	X			X		1,5,6,9	p		p	p				CHN(50) USA(6) UTA(5) ESP(4) ARG(3)	CAN(22) USA(12) ITA(10) UKR(7) FRA(5)	
Pearl millet *[43]*	*Pennisetum*	X	X			X	8		p						IND(33) NGA(22) NER(8) CHN(7) RUS(4) *[31]*	IND(49) USA(13) FRA(10) CAN(8) UGA(5)	80% cult. 10% wild

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Pecan, hickory	*Carya*	X					1,11,12			p		p	p			USA(56) MEX(26) ZAF(3) ESP(2) AUS(2)	
Pelargonium	*Pelargonium*	X					8		p							FRA(66) SVK(22) DEU(8) CZE(4)	
Pepper	*Piper*	X					2,4,8,10		p	p		p			IND(23) IDN(21) BRA(18) MYS(8) LKA(7) *[32]*	IND(71) BRA(25) USA(1) HND(1) CRI(1)	
Perennial soybean *[43]*	*Neonotonia = Glycin*	X				X	8		p							KEN(41) AUS(23) USA(14) BRA(8) COL(7)	
Persimmon	*Diospyros*	X					1,2,5,11,12			p		p	p		CHN(72) KOR(11) JPN(11) ITA(3) BRA(2)	CHN(22) ITA(14) USA(14) THA(10) TUR(9)	
Pigeon pea	*Cajanus*	X				X	4,8		p	s					IND(86) MMR(6) MWI(2) UGA(2) TZA(2)	IND(72) KEN(7) PHL(6) MWI(3) IDN(2)	
Pineapple	*Ananas*	X					10					p			THA(17) PHL(11) BRA(10) IND(8) CHN(8)	FRA(28) BRA(27) USA(9) CIV(4) JPN(4)	
Pinenut	*Pinus*	X					2,7	p	p	p	p					FRA(90) COL(5) HND(1) CZE(1) NLD(1)	
Pistachio, mastic	*Pistacia*	X					5,7			p					IRN(48) USA(23) TUR(10) SYR(8) CHN(8) *[33]*	ESP(80) USA(6) SYR(6) AUS(3) IRN(1)	
Pitanga	*Eugenia*	X					2,4,10			p		p				BRA(47) ECU(11) USA(11) HND(8) CRI(5)	
Pomegranate	*Punica*	X					6				p					RUS(49) IRN(19) TUR(11) USA(9) BRA(2)	
Poppy	*Papaver*	X					6,7	p	p		p				CZE(42) TUR(36) FRA(7) DEU(4) HUN(3)	TUR(23) HUN(20) DEU(14) UKR(14) RUS(11)	
Potato	*Solanum*	X	X	X	X	X	8,10,11,12		p			p	p		CHN(19) RUS(11) POL(8) IND(7) USA(7)	DEU(14) RUS(10) COL(9) PER(8) ZAF(7) *[34]*	95% cult. 40% wild

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Prickly pear	*Opuntia*	X					10,11					p				MEX(47) PER(33) BRA(9) ESP(4) USA(4)	
Proso millet ***[43]***	*Panicum*	X		X		X	1,4,8,11,12		p	p		p	p			RUS(23) CHN(20) UKR(12) JPN(10) KEN(7)	
Pumpkin, squash	*Cucurbita*	X				X	10,11,12					p	p		CHN(22) IND(22) UKR(7) EGY(4) IRN(3) *[35]*	USA(15) MEX(14) CRI(9) RUS(8) CHN(8)	
Purslane	*Portulaca*	X					9,11	p				p				SDN(33) DEU(18) TUR(14) GBR(10) USA(8)	
Quince	*Cydonia*	X					6				p				TUR(27) CHN(18) IRN(8) MAR(8) ARG(7)	RUS(26) UKR(12) TUR(11) ITA(11) USA(8)	
Quinoa, chenopodium	*Chenopodium*	X					6,7,9,10,11,12	p	p		p	p	p		PER(63) BOL(35) ECU(2) *[36]*	PER(40) BOL(36) DEU(8) BRA(6) ECU(4)	
Radish	*Raphanus*	X					1,4,7	p		p						CHN(27) RUS(16) USA(10) DEU(10) JPN(10)	
Raspberry, blackberry	*Rubus*	X					1,2,4,9,10,12	p		p		p	p		RUS(27) YUG(15) POL(12) USA(11) DEU(8) *[37]*	USA(33) CAN(12) GBR(11) SWE(9) RUS(6)	
Red currant, black currant	*Ribes*	X					1,7,9,12	p	p	p	p		p		RUS(34) POL(23) DEU(21) CZE(3) AUT(3)	SWE(50) GBR(10) USA(8) UKR(7) RUS(5)	
Redtop ***[43]***	*Agrostis*	X				X	6,7,9,12	p	p		p		p			USA(27) RUS(26) NZL(19) SWE(11) GBR(4)	
Reed canary ***[43]***	*Phalaris*	X				X	7,9	p	p		p					USA(35) NZL(30) CAN(6) BRA(4) TUR(4)	
Rescue ***[38]***	*Bromus*	X				X	9,10,12	p				p	p			USA(30) NZL(16) CHL(10) ARG(10) CAN(6)	

Table on genepools for suggested crops for the Multilateral System and their centres of diversity

		CROPS SUGGESTED BY:						REGIONS OF DIVERSITY [A]									
Common name [B]	**Genus**	**European Countries**	**African Countries**	**Asian Countries**	**Latin American & Caribbean Countr.**	**North American Countries**	**Vavilovian Centres** [C]	**European Region**	**African Region**	**Asian Region**	**Near Eastern Region**	**Latin American & Caribbean Region**	**North American Region**	**Pacific Region**	**Percentage of World Production** [D]	**Germplasm holdings** [E]	**% Germplasm in collections** [F]
Rhubarb	*Rheum*	X					1,5			p						SWE(74) DEU(10) HUN(9) SVK(2) CZE(2)	
Rice	*Oryza*	X	X	X	X	X	1,2,3,4,8,10,11		p	p		p		p	CHN(32) IND(23) IDN(9) VNM(5) BGD(5) *[39]*	CHN(22) PHL(20) IND(8) CIV(5) JPN(5)	95% cult. 10% wild
Rocket	*Diplotaxis*	X					7	p								AUS(55) USA(26) DEU(15) CAN(2) GBR(2)	
Rocket	*Eruca*	X					4,7,8	p	p	p	p					AUS(23) USA(21) DEU(18) IND(13 RUS(7)	
Rooted chervil	*Chaerophyllum*	X					9	p								DEU(76) FRA(12) CHE(5) USA(5) GBR(2)	
Rose	*Rosa*	X					1,5,6,9	p		p	p					SWE(59) FRA(31) DEU(4) BRA(2) BEL(1)	
Rosemary	*Rosmarinus*	X					7	p	p		p					PRT(77) DEU(15) BRA(4) TTO(4)	
Rye	*Secale*	X			X	X	1,5,6,8		p	ps	p				RUS(27) DEU(20) POL(19) BLR(8) UKR(5)	DEU(20) CAN(15) RUS(14) POL(14) USA(9)	
Safflower	*Carthamus*	X					5,6			p	p				IND(49) USA(20) MEX(12) KAZ(4) ETH(4)	CHN(34) IND(23)USA(18) MEX(12) AUS(4)	
Saffron	*Crocus*	X					6,7	p	p		p					BGR(33) TTO(33) USA(33)	
Sage	*Salvia*	X					2,7,11	p	p	p	p	p				FRA(18) BEL(16) GRC(10) PRT(10) TUR(10)	
Sainfoin mediterranean	*Hedysarum*	X					7,9	p		p						USA(40) ITA(19) LBY(16) RUS(5) DEU(3)	
Sainfoin *[43]*	*Onobrychis*	X				X	6,9	p			p					RUS(25) USA(24) SYR(10) AUS(8) ITA(5)	

Table on genepools for suggested crops for the Multilateral System and their centres of diversity

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Salsify	*Tragopogon*	X					7	p								DEU(44) USA(38) CHE(8) CZE(6) GBR(3)	
Savory	*Satureja*	X					7	p								RUS(37) CZE(17) DEU(14) PRT(13) USA(7)	
Sea buckthorn	*Hippophae*	X						p		p						SWE(93) LTU(2) RUS(1) FIN(1) UKR(1)	
Service	*Sorbus*	X					5,6,9	p	p		p					SWE(73) USA(13) DEU(5) NLD(2) HUN(2)	
Sesame	*Sesamum*	X					1,4,8		p	s					CHN(27) IND(20) MMR(11) SDN(10) UGA(4)	IND(35) CHN(26) ISR(9) MEX(7) VEN(4)	
Shiso	*Perilla*	X					1			p						CHN(89) RUS(5) NPL(2) DEU(2) USA(2)	
Snake cucumber	*Trichosanthes*	X					1,2,4			p						NGA(20) USA(19) IND(18) LKA(16) PHL(8)	
Sorghum	*Sorghum*	X	X	X	X	X	1,4,7,8,10	p	p	ps	p	p			USA(22) IND(16) NGA(13) MEX(11) ARG(5)	IND(21) USA(21) CHN(8) BRA(6) RUS(5)	80% cult. 10% wild
Sorrel	*Rumex*	X					4,8,9,11	p	p	p		p				HUN(42) PRT(25) DEU(11) GBR(7) RUS(6)	
Soybean	*Glycine*	X			X	X	1			p					USA(49) BRA(20) ARG(12) CHN(9) IND(3)	CHN(27) USA(11) TWN(9) BRA(7) IND(7)	60% cult. 30% wild
Spinach	*Spinacia*	X					5			p					CHN(77) JPN(4) USA(3) TUR(3) FRA(2)	NLD(18) RUS(17) CHN(16) USA(13) FRA(9)	
Spoonwort	*Cochlearia*	X					9	p								DEU(94) GBR(6)	
Star grass *[43]*	*Cynodon*	X				X	4,8		p	p						USA(50) KEN(28) AUS(6) COL(5) BRA(3)	

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Strawberry	*Fragaria*	X					1,5,9,10,12	p		p		p	p		USA(27) ESP(13) ITA(6) JPN(6) POL(5)	SWE(40) CAN(30) USA(11) RUS(3) DEU(2)	
Stylo ***[43]***	*Stylosanthes*	X				X	8,10		p			p				COL(44) AUS(18) BRA(17) KEN(15) ETH(2)	
Sugarcane	*Saccharum*	X		X	X	X	1,2,4,8		s	p					IND(25) BRA(24) CHN(6) THA(4) MEX(4)	BRA(26) IND(18) CUB(12) USA(10) GUY(10)	70% cult. 5% wild
Sunflower	*Helianthus*	X		X	X	X	9,12	p					p		ARG(24) RUS(12) UKR(11) FRA(8) CHN(7)	ROM(20) YUG(16) FRA(12) USA(11) RUS(9)	
Sweet clover ***[43]***	*Melilotus*	X				X	2,4,7,9	p	p	p	p					CAN(37) RUS(21) USA(18) ARG(11) KEN(4)	
Sweet potato	*Ipomoea*	X		X		X	1,2,4,10,11			ps		ps			CHN(85) UGA(2) IDN(1) VNM(1) NGA(1)	PER(23) JPN(11) USA(10) CHN(9) PHL(7)	50% cult. 1% wild
Szechuan pepper	*Zanthoxylum*	X					1			p						HND(71) USA(29)	
Tamarind	*Tamarindus*	X					8		p							PHL(51) USA(17) BFA(10) ETH(6) FRA(3)	
Tannia, malanga	*Xanthosoma*	X				X	10,11					p			VEN(27) SLV(23) DOM(18) PER(16) CUB(11) *[40]*	USA(16) IND(13) GHA(10) PRI(9) CUB(8)	
Taro	*Colocasia*	X				X	1,2,4			ps					NGA(43) GHA(19) CHN(17) CIV(4) JPN(3)	PNG(18) MYS(14) IND(12) IDN(8) PHL(7)	30% cult. 0% wild
Tarragon, genepi	*Artemisia*	X					1,5,7,9	p	p	p	p					USA(31) DEU(22) PRT(14) CHE(9) AUT(4)	
Teff	*Eragrostis*	X					8		p							ETH (46) USA(19) KEN(16) BRA(6) MEX(4)	
Thyme	*Thymus*	X					7	p	p	p						PRT(24) FRA(14) TUR(11) SWE(10) GRC(8)	

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Timothy *[43]*	*Phleum*	X				X	9	p								POL(48) DEU(16) RUS(13) USA(6) SWE(4)	
Tobacco	*Nicotiana*	X					3,10,12					p	p	p	CHN(36) IND(10) BRA(9) USA(7) TUR(4)	CHN(22) POL(15) IND(12) USA(11) CUB(6)	
Tomatillo, cape gooseberry	*Physalis*	X					9,10,11,12	p				p	p			MEX(49) NLD(9) GTM(8) COL(7) CRI(6)	
Tomato	*Lycopersicon*	X		X		X	10					p			CHN(19) USA(13) ITA(7) TUR(7) EGY(6)	USA(26) TWN(9) PHL(7) ESP(7) BRA(5)	95%
Trebizond date	*Elaeagnus*	X					1,5					p				SWE(84) USA(9) HUN(3) IRN(3) HND(1)	
Triticale	x *Triticosecale*	X													DEU(30) POL(20) CHN(15) FRA(13) AUS(6)	MEX(99) AUT(1)	
Vanilla	*Vanilla*	X					11					p			IDN(39) MDG(30) MEX(11) CHN(10) COM(3)	MEX(70) WSM(13) CRI(9) HND(4) USA(3)	
Verbena	*Lippia*	X					8,10		p			p				GTM(77) TTO(8) USA(5) SLV(3) BRA(3)	
Vetch	*Vicia*	X					1,5,6,7,9,10,12	ps	p	p	p	p	p		RUS(18) TUR(17) ESP(17) MEX(9) ETH(7)	SYR(23) DEU(10) ESP(8) CHN(6) ITA(6)	
Vetchling *[43]*	*Lathyrus*	X				X	5,7,9	p	p	p	p					FRA(26) SYR(12) GBR(9) USA(8) AUS(8)	
Walnut	*Juglans*	X					1,5,9,10,11,12	ps		p		p	p		CHN(25) USA(19) IRN(12) TUR(10) UKR(4)	FRA(32) USA(12) ESP(9) UKR(7) ITA(5)	
Watercress	*Nasturtium*	X					1,9	p		p						UKR(68) DEU(15) CHN(6) USA(6) CHE(3)	
Watermelon, egusi	*Citrullus*	X					4,7,8	p	p	p	p				CHN(61) TUR(6) IRN(4) USA(3) EGY(2) *[41]*	RUS(27) USA(21) ISR(9) CHN(9) BRA(6)	

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Wheat	*Triticum*	X	X	X	X	X	1,2,4,5,6,7,8,9	p	p	p	p				CHN(17) IND(12) USA(11) FRA(6) RUS(6) *[42]*	MEX(9) USA(7) UKR(6) CHL(6) CHN(6)	95% cult. 60% wild
Wheatgrass ***[43]***	*Agropyron*	X				X	6,7,9,12	p	p		p		p			USA(38) RUS(15) SYR(13) CHN(11) CAN(6)	
Wild rice	*Zizania*	X					1,12			p			p				
Wild rye ***[43]***	*Elymus*	X				X	1,12			p			p			USA(41) SWE(41) RUS(9) CAN(2) CHN(2)	
Woad	*Isatis*	X						p		p						DEU(68) RUS(24) GBR(3) IRN(2) USA(2)	
Yams	*Dioscorea*	X				X	1,2,4,8,10,11		p	p		p			NGA(69) GHA(9) COV(8) BEN(4) TGO(2)	NGA(21) CIV(16) BEN(11) IND(9) PNG(5)	
	Acacia	X					3,8,10		p			p		p		KEN(19) BFA(18) ETH(16) USA(7) GBR(7)	
	Aegilops	X					5,6,7,9	p	p	p	p					SYR(14) RUS(13) USA(11) ISR(10) JPN(9)	
	Amelanchier	X					5,6,7,9	p	p	p	p					SWE(77) USA(13) CAN(8) BEL(2) CZE(1)	
	Anthemis	X					9	p								PRT(51) DEU(31) TUR(10) GBR(5) CZE(3)	
	Anthyllis	X					9	p								USA(40) DEU(19) ITA(15) GBR(14) RUS(5)	
	Aronia	X					12						p			SWE(99)	
	Astragalus	X					1,7,8,9	p	p	p	p					USA(33) SYR(18) JPN(9) CHN(6) CAN(6)	
	Berberis	X					9	p								FRA(49) CZE(23) HUN(12) SWE(11) CHL(3)	

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	Calamagrostis	X					7,9	p	p		p					URY(37) KEN(22) DEU(19) ECU(7) SWE(7)	
	Cynosurus	X					6,9	p			p					NZL(89) GBR(5) USA(4) DEU(1)ZAF(1)	
	Derris	X					2			p						PHL(86) USA(6) COL(3) HND(3) LKA(3)	
	Dracocephalum	X					5,9	p		p						DEU(71) ROM(14) LTU(7) USA(7)	
	Eucalyptus	X					3,7	s				s		p		ARG(37) FRA(20) COL(11) HND(11) URY(7)	
	Euonymus	X					1			p						SWE(59) USA(25) CZE(8) HUN(7)	
	Euphorbia	X					7,8	p	p							DEU(74) USA(10) ISR(7) HND(3) AUS(2)	
	Galega	X					6,9	p			p					RUS(45) DEU(21) USA(12) ARG(8) SVK(5)	
	Hemerocallis	X					1			p						SWE(94) USA(4) DEU(1) CHN(1)	
	Holcus	X					3,9	p						p		NZL(79) USA(6) PRT)4) CAN(3) BRA(2)	
	Koeleria	X					9	p								USA(80) CAN(7) DEU(5) TUR(5) GBR(2)	
	Lavandula	X					7	p	p		p					FRA(26) TUR(14) PRT(13) CZE(13) GRC(12)	
	Leucaena	X				X	10,11					p				USA(42) UND(16) AUS(10) MEX(6) PHL(5)	

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	Leymus	X					1,9,12	p		p			p			USA(67) SWE(25) RUS(6) ARG(1) DEU(1)	
	Lolium	X				X	7,9	p			p		s			POL(17) NZL(16) DEU(14) GBR(10) FRA(7)	
	Lonicera	X					1,9	p		p						SWE(68) RUS(23) CZE(3) BEL(2) USA(2)	
	Lotononis	X					8		p							AUS(50) KEN(20) USA(11) ZAF(8) ETH(8)	
	Lotus	X				X	7,9	p	p		p					NZL(27) USA(15) CAN(11) ROM(8) HUN(6)	
	Melissa	X					7	p		p	p					PRT(26) DEU(21) TUR(17) SVK(7) CZE(7)	
	Miscanthus	X					1,2			p						USA(64) JPN(14) PHL(9) CUB(5) CZE(4)	
	Montia	X					11					p					
	Myrrhis	X					9	p								CHE(50) DEU(42) CAN(8)	
	Ornithopus	X					7	p								AUS(28) NZL(19) ESP(16) POL(13) BRA(6)	
	Phacelia	X					12	s					p			DEU(69) RUS(20) USA(7) SWE(2) ZAF(2)	
	Polygonum	X					1,2,6			p	p					RUS(44) USA(18) DEU(17) GBR(6) CZE(6)	
	Poncirus	X					1,2			p						BRA(27) USA(21) FRA(14) CHN(12) IND(8)	
	Quassia	X					10					p				CRI(50) HND(50)	
	Raphanobrassica x	X														DEU(100)	

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	Reseda	X					6,7,9	p	p		p					DEU(70) GBR(13) USA(11) LBY(3) GRC(3)	
	Symphytum	X					6				p					DEU(39) RUS(37) CAN(11) USA(7) POL(4)	
	Tripsacum	X					10,11,12					p	p			USA(33) JPN(19) MEX(18) BRA(12) COL(7)	
	Trisetum	X					9	p								USA(49) BRA(16) DEU(13) SVK(5) CZE(5)	
	Viburnum	X					1,2,12			p			p			SWE(56) USA(18) CZE(9) UKR(8) HUN(7)	
	x *Festulolium*	X					9	p								PRT(47) CZE(44) ZAF(9)	
Grasses (Gramineae)	*Axonopus*					X	11					p				URY(28) COL(26) USA(23) BRA(19) ETH(3)	
Grasses (Gramineae)	*Bothriochloa*					X	2,3,4,8,11,12		p	p		p	p	p		USA(70) KEN(18) AUS(5) ZAF(3) COL(2)	
Grasses (Gramineae)	*Cenchrus*					X	8		p							KEN(34) USA(23) AUS(11) IND(10) BRA(8)	
Grasses (Gramineae)	*Chloris*					X	8		p							KEN(50) JPN(29) USA(7) AUS(6) COL(2)	
Grasses (Gramineae)	*Ischaemum*					X	2			p						KEN(48) USA(21) COL(14) ZAF(9) URY(5)	
Grasses (Gramineae)	*Melinis*					X	8		p							KEN(54) BRA(28) COL(8) ETH(5) GBR(2)	
Grasses (Gramineae)	*Schizachyrium*					X	12			s			p			USA(90) MAR(3) ZAF(3) GBR(2) ETH(2)	

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Grasses (Gramineae)	*Setaria*					X	1,8,11		p	p		p				CHN(60) RUS(11) FRA(10) IND(7) KEN(3)	
Grasses (Gramineae)	*Themeda*					X	3							p		KEN(69) USA(15) ZAF(15) COL(1)	
Legumes (Leguminosae)	*Aeschynomene*					X	10					p				COL(49) AUS(17) BRA(13) USA(11) EHT(3)	
Legumes (Leguminosae)	*Alysicarpus*					X	8		p							COL(45) AUS(17) KEN(17) EHT(11) USA(10)	
Legumes (Leguminosae)	*Bauhinia*					X	4,8		p	p						USA(53) COL(18) ETH(6) GBR(6) BFA(5)	
Legumes (Leguminosae)	*Calopogonium*					X	11					p				COL(57) VRA(27) AUS(8) ETH(2) PHL(2)	
Legumes (Leguminosae)	*Canavalia*					X	1,2,4,8,10,11		p	p		p				COL(40) AUS(12) BRA(6) PHL(6) CHN(6)	
Legumes (Leguminosae)	*Centrosema*					X	10					p				COL(58) AUS(19) BRA(12) MEX(2) ETH(2)	
Legumes (Leguminosae)	*Clitoria*					X	2,8		p	p						KEN(40) COL(18) AUS(12) IND(11) MEX(7)	
Legumes (Leguminosae)	*Coronilla*					X	9	p								SYR(25) USA(25) CAN(13) RUS(6) ITA(6)	
Legumes (Leguminosae)	*Desmodium*					X	2,8,10,11		p	p		p				COL(71) AUS(8) USA(5) KEN(5) BRA(3)	
Legumes (Leguminosae)	*Dioclea*					X										COL(99) ETH(1)	
Legumes (Leguminosae)	*Galactia*					X										COL(68) AUS(19) BRA(7) CUB(2) USA(1)	

Table on genepools for suggested crops for the Multilateral System and their centres of diversity

		CROPS SUGGESTED BY:						REGIONS OF DIVERSITY [A]									
Common name [B]	**Genus**	**European Countries**	**African Countries**	**Asian Countries**	**Latin American & Caribbean Countr.**	**North American Countries**	**Vavilovian Centres** [C]	**European Region**	**African Region**	**Asian Region**	**Near Eastern Region**	**Latin American & Caribbean Region**	**North American Region**	**Pacific Region**	**Percentage of World Production** [D]	**Germplasm holdings** [E]	**% Germplasm in collections** [F]
Legumes (Leguminosae)	*Indigofera*					X	2,4,8,10,12		p	p		p	p			AUS(33) COL(22) KEN(12) USA(10) ZAF(8)	
Legumes (Leguminosae)	*Lablab*					X	8		p							CHN(23) KEN(18) PHL(16) IND(10) USA(5)	
Legumes (Leguminosae)	*Lespedeza*					X	1			p						JPN(58) USA(25) CHN(8) ZAF(3) RUS(3)	
Legumes (Leguminosae)	*Macroptilium*					X	11					p				COL(34) AUS(31) KEN(11) BRA(9) BEL(4)	
Legumes (Leguminosae)	*Pueraria*					X	1,2			p						COL(78) ZAF(7) USA(5) BRA(5) PHL(2)	
Legumes (Leguminosae)	*Stizolobium*					X	1,2,4			p						ZAF(42) PHL(32) BRA(21) PAN(5)	
Legumes (Leguminosae)	*Tephrosia*					X	8		p							COL(28) AUS(23) KEN(15) USA(13) ZAF(7)	
Legumes (Leguminosae)	*Teramnus*					X	2,8,11		p	p		p				COL(52) AUS(20) KEN(16) ETH(4) BRA(4)	
Legumes (Leguminosae)	*Vetiveria*					X	2,4			p						USA(68) COL(22) ETH(5) TTO(3) HND(3)	
Legumes (Leguminosae)	*Zornia*					X	8,10		p			p				COL(77) AUS(10) BRA(6) ETH(4) USA(2)	

Table on genepools for suggested crops for the Multilateral System and their centres of diversity

Cell: P4
Comment: Data refer to FAO commodity "agave fibres".
Additional commodity "sisal": BRA(52) MEX(12) CHN(9) KEN(7) TZA(6)

Cell: P6
Comment: Data refer to FAO commodity "pimento, allspice".

Cell: P9
Comment: Data refer to FAO commodity "anise, badian, fennel".

Cell: P16
Comment: Data refer to FAO commodity "artichokes".

Cell: P21
Comment: Banana: IND(19) BRA(9) CHN(9) ECU(9) PHL(6)
Plantain: UGA(31) COL(9) RWA(7) GHA(7) NGA(6)

Cell: P24
Comment: Data refer to dry bean production. The FAO commodity "dry beans" covers all species of Phaseolus and in a few countries, such as India, also Vigna species.
A second commodity that refers to Phaseolus and Dolichos species is "green beans", i.e. beans harvested green: CHN(31) TUR(10) IND(9) ESP(6) ITA(4)

Cell: P25
Comment: Data refer to FAO commodity "sugar beets".

Cell: P28
Comment: Blueberries: USA(51) CAN(25) POL(14) NLD(3) LTU(2)
Cranberries: USA(86) CAN(10) LVA(3) AZE(0.3)

Cell: P32

Table on genepools for suggested crops for the Multilateral System and their centres of diversity

Comment: Data refer to FAO commodity "cabbages". The main varieties included are red, white and savoy cabbages; Chinese cabbages; Brussels sprouts; geen kale; and sprouting broccoli.
FAO commodity "rapeseed": CHN(27) CAN(18) IND(15) FRA(9) DEU(9)

Cell: P34
Comment: Data refer to FAO commodity "chillies & peppers, green".

Cell: P37
Comment: Data refer to FAO commodity "nutmeg, mace, cardamom".

Cell: P48
Comment: Data refer to FAO commodity "chicory root".

Cell: P53
Comment: Production data relate to cocoa beans, fermented and dried.

Cell: P59
Comment: Data refer to FAO commodity "seed cotton".

Cell: P60
Comment: Production data relate to dry cowpeas.

Cell: P64
Comment: Data refer to FAO commodity "cucumbers and gherkins".

Cell: Q70
Comment: Data refer to eggplant (Solanum melongena) collections only.
Naranjilla (Solanum quitoense): COL(90) ECU(7) CRI(1) NLD(1)

Table on genepools for suggested crops for the Multilateral System and their centres of diversity

Cell: P73
Comment: Data refer to dry faba beans.
Green faba beans: MAR(13) CHN(11) ITA(9) PER(8) ESP(7)

Cell: P75
Comment: Data refer to FAO commodity "anise, badian, fennel".

Cell: P80
Comment: Data refer to FAO commodity "flax fibre and tow".

Cell: P88
Comment: Data refer to FAO commodity "grapes".

Cell: P92
Comment: Data refer to FAO commodity "hemp fibre and tow".

Cell: P118
Comment: Data refer to FAO commodity "lupins".

Cell: P120
Comment: Data refer to FAO commodity "maize".
There is an additional commodity "green corn (maize)": USA(49) NGA(7) FRA(5) PER(4) CAN(4)

Cell: P130
Comment: Data refer to FAO commodity "cantaloupes & other melons".
An additional commodity is "melonseed": NGA(48) ETH(13) SDN(13) CMR(8) COG(5)

Cell: P139
Comment: Data refer to FAO commodity "oil palm fruit".

Table on genepools for suggested crops for the Multilateral System and their centres of diversity

Cell: P142
Comment: Garlic: CHN(65) IND(5) KOR(4) USA(3) EGY(2)
Onions, dry: CHN(26), IND(12) USA(7) TUR(5) IRN(4);
Onions + shallots, green: MEX(31) JPN(13) KOR(12) CHN(9) TUR(6)

Cell: P151
Comment: Data refer to dry peas.
Green peas: IND(28) CHN(17) USA(15) FRA(8) GBR(5)

Cell: P152
Comment: Almonds: USA(34) ESP(17) ITA(8) IRN(8) SYR(5):
Apricots: TUR(20) IRN(9) ITA(8) PAK(7) FRA(5)
Cherries: IRN(13) USA(11) TUR(11) ITA(8) DEU(7)
Peaches and nectarines: CHN(27) ITA(13) USA(11) ESP(8) GRC(8)
Plum: CHN(42) USA(9) YUG(6) ROM(4) DEU(4)
Sour cherries: POL(16) RUS(15) TUR(15) USA(14) DEU(8)

Cell: P153
Comment: Data refer to FAO commodity "groundnuts in shell". Bambara beans are listed separately: BFA(78) MLI(22)

Cell: P155
Comment: Data refer to FAO commodity "millet". Note, that some countries, especially in Africa, make no distinction between millet and sorghum in their reports; in such cases, combined figures are given under millet.

Cell: P158
Comment: Data refer to FAO commodity "pepper, white/long/black".

Cell: P164
Comment: Data refer to pistachio only.

Table on genepools for suggested crops for the Multilateral System and their centres of diversity

Cell: Q168
Comment: Data refer to the genus Solanum except Solanum melongena (eggplant) and Solanum quitoense (naranjilla).

Cell: P171
Comment: Data refer to FAO commodity "pumpkins, squash, gourds".

Cell: P174
Comment: Data refer to FAO commodity "quinoa".
Only three producing countries are listed in FAOSTAT.

Cell: P176
Comment: Data refer to raspberries only.

Cell: A180
Comment: According to Mabberley, D.J. (1997), The Plant-Book, A portable dictionary of the vascular plants, (2nd edition), Cambridge University Press, rescue grass is Ceratochloa carthartica.

Cell: P182
Comment: Data refer to FAO commodity "rice, paddy".

Cell: P215
Comment: Data refer to FAO commodity "yautia".

Cell: P232
Comment: Data refer to FAO commodity "watermelons".

Cell: P233
Comment: Note: FAOSTAT includes available data for spelt with those for wheat, except for the 15 CIS states.

3. NOTES TO THE TABLE

This Table has been elaborated by J. Engels, C. Fowler, T. Hodgkin, J. Robinson, and I. Thormann in close co-operation with the FAO. Zeven and de Wet (1982) has been used as the primary reference, with some limited interpretation by the authors. In a few cases this has meant that no entry could be made.

A. The regions of diversity are allocated to individual entries based on the data in Zeven and de Wet (1982) and from some other relevant studies on genetic diversity, in particular the Inventory of Cultivated Plants of Mansfeld (1986) when Zeven and de Wet did not provide information on specific taxa. The data presented in the Table refer to regions of crop genepool diversity and not to individual crop species. Only for the taxa *Cucumis, Helianthus, Ipomoea, Linum, Setaria, Solanum* and *Vicia*, subgenepools were considered, since individual crops involved are very distinct and separate production data were available. Except where specific information suggests that this is not the case, the Vavilov Mediterranean centre is considered to indicate that Africa, the Near East and Europe all share a role as primary centres of diversity.

European Region	=	7 (Mediterranean) + 9 (European-Siberian) centres
African Region	=	8 (African) + 9 (Mediterranean) centres
Asian Region	=	1 (Chinese-Japanese) + 2 (Indochinese-Indonesian) + 4 (Hindustani) + 5 (Central Asian) centres
Pacific Region	=	3 (Australian) centre
Near Eastern Region	=	6 (Near Eastern) + 9 (Mediterranean) centres
Latin America & Caribbean Region	=	10 (South American) + 11 (Central American and Mexican) centres
North American Region	=	12 (North American) centre

Notation is as follows:

p: primary area of diversity or part of it is located in the region. In cases where Zeven and de Wet (1982) contained no reference to the species or genus in question, the primary distribution area indicated in Mansfeld (1968) was assumed to be the primary area of diversity

s: secondary area/areas of diversity or part of it/them is/are located in the region.

ps: primary area of diversity and at least a secondary area of diversity are located in the region.

B. Sometimes common names can be misleading and therefore genus names have been used as the preferred identifier. Some non-English common names have been used when the English common name exists, e.g. *Guizotia abyssinica* is Niger seed, but is referred to as noug. For several taxa, no English common name has been provided. Furthermore, there are some instances where the English name refers to the harvested crop and not the plant itself, e.g. hazel is the plant, hazelnut the crop.

C. Vavilovian Centres were identified using the classification found in A.C. Zeven and J.M.J. de Wet (1982), Dictionary of Cultivated Plants and their Regions of Diversity: Excluding Ornamentals, Forest Trees and Lower Plants. CAPD, Wageningen, Netherlands. The centres are numbered as follows:

1. Chinese-Japanese
2. Indochinese-Indonesian
3. Australian
4. Hindustani
5. Central Asian
6. Near Eastern
7. Mediterranean
8. African
9. European-Siberian
10. South American
11. Central American and Mexican
12. North American

Numbers in parentheses indicate that the centre is cited as a secondary centre or as a centre for one of the minor cultivated species referred to under a single common crop name. In cases where no centre of diversity was found in the literature the fields have been left blank.

D. The source of the information shown is the FAO statistical database FAOSTAT. The production data for primary crops in 2000 are considered. Estimated and non estimated production figures are dealt with in the same manner. The Table shows the 5 major producing countries for all those crops that appear as commodities in FAOSTAT. The countries are listed with their standard ISO codes. In addition, the percentage that each individual country contributes to the total world production is given in parentheses after the country code.

E. These data were taken from IPGRI's Germplasm Holdings Database. The five major *ex situ* holdings are listed by country and percentage contribution.

F. These data were taken directly from the FAO publication: *The State of the World's Plant Genetic Resources for Food and Agriculture.*

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1. Data refer to FAO commodity “agave fibres”.
   Additional commodity “sisal”: BRA(52) MEX(12) CHN(9) KEN(7) TZA(6)
2. Data refer to FAO commodity “pimento, allspice”.
3. Data refer to FAO commodity “anise, badian, fennel”.
4. Data refer to FAO commodity “artichokes”.
5. Banana: IND(19) BRA(9) CHN(9) ECU(9) PHL(6)
   Plantain: UGA(31) COL(9) RWA(7) GHA(7) NGA(6)
6. Data refer to dry bean production. The FAO commodity “dry beans” covers all spices of *Phaseolus* and in a few countries, such as India, also Vigna species.
   A second commodity that refers to Phaseolus and Dolichos species is “green beans”, i.e. beans harvested green: CHN(31) TUR(10) IND(9) ESP(6) ITA(4)
7. Data refer to FAO commodity “sugar beets”.
8. Blueberries: USA(51) CAN(25 POL(14) NLD(3) LTU(2)
   Cranberries: USA(86) CAN(10) LVA(93) AZE(0.3)
9. Data refer to FAO commodity “cabbages”. The main varieties included are red, white and Savoy cabbages; Chinese cabbages; Brussels sprouts; green kale and sprouting broccoli.
   FAO commodity “rappelled”: CHN(27) CAN(18) IND(15) FRA(9) DEU(9)
10. Data refer to FAO commodity “chillies & peppers, green”.
11. Data refer to FAO commodity “nutmeg, mace, cardamom”.
12. Data refer to FAO commodity “chicory root”.
13. Production data relate to cocoa beans, fermented and dried.

14. Data refer to FAO commodity “seed cotton”.
15. Production data relate to dry cowpeas.
16. Data refer to FAO commodity “cucumbers and gherkins”.
17. Data refer to eggplant (*Solanum melongena*) collections only.
    Naranjilla (*Solanum quitoense*): COL(90) ECU(7) CRI(1) NLD(1)
18. Data refer to dry faba beans.
    Green faba beans: MAR(913) CHN(11) ITA(9) PER(8) ESP(7).
19. Data refer to FAO commodity “anise, badian, fennel”.
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23. Data refer to FAO commodity “lupins”.
24. Data refer to FAO commodity ‘maize”.
    There is an additional commodity “green corn (maize)”: USA(49) NGA(7) FRA(5) PER(4) CAN(4)
25. Data refer to FAO commodity “cantaloupes & other melons”.
    An additional commodity is “melonseed”: NGA(48) ETH(13) SDN(13) CMR(8) COG(5)
26. Data refer to FAO commodity “oil palm fruit”.
27. Garlic: CHN(65) IND(95) KOR(4) USA(3) EGY(2)
    Onions, dry: CHN(26), IND(12) USA(7) TUR(95) IRN(4);
    Onions + shallots, green: MEX(31) JPN(13) KOR(12) CHN(9) TUR(6)
28. Data refer to dry peas.
    Green peas: IND(28) CHN(17) USA(15) FRA(8) GBR(5)
29. Almonds: USA(34) ESP(17) ITA(8) IRN(8) SYR(5)
    Apricots: TUR(20) IRN(9) ITA(8) PAK(7) FRA(5)
    Cherries: IRN(13) USA(11) TUR(11) ITA(8) DEU(7)
    Peaches and nectarines: CHN(27) ITA(13) USA(11) ESP(8) GRC(8)
    Plums: CHN (42) USA(9) YUG(6) ROM(4) DEU(4)
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37. Data refer to raspberries only.
38. According to Mabberley, D.J. (1997), The Plant Book, a portable dictionary of the vascular plants, (2nd edition), Cambridge University Press, rescue grass is *Ceratochioa carthartica.*
39. Data refer to FAO commodity “rice, paddy”.
40. Data refer to FAO commodity “yautia”.
41. Data refer to FAO commodity ‘watermelons”.
42. Note: FAOSTAT includes available data for spelt with those for wheat, except for the 15 CIS states.

43. This crop type originally comprised data separately for the major species of the genus and for the genus overall, according to suggestions made by delegates from different regions.

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