

STATISTICS ON THE PRODUCTION AND TRADE OF FOREST SEEDS AND OTHER FOREST PLANT MATERIAL

Introduction

The purpose of this short study was to examine the possibility of collecting information on the production and trade in forest seeds and other forest plant material from existing national and international statistics. An additional objective was to examine statistics on production and trade of other types of seed, to see if these could be used to make comparisons between forestry and the rest of the agricultural sector.

This paper has been prepared to explain the various classification systems used for production and trade and to present the results of the investigation.

Overview

There is a variety of classification systems in use around the world to distinguish between different productive activities and commodities or products. Broadly speaking, the aim of these different systems is to distinguish between different products or productive activities in national statistics. The different systems can be grouped into three distinct types:

- **Economic activities:** one type of classification system is used to distinguish between different economic activities. These systems are generally used to record information about macroeconomic variables such as the quantity and value of production, value-added, employment and investment. Classifications of economic activities generally do not go into a great level of detail.
- **Products:** a second type of classification system is used to distinguish between different types of product. Product classifications are used to record quantities and values of production in national statistics. They are also used to specify individual products for the purposes of implementing national regulations (e.g. product standards, building codes, taxes and subsidy rates). Product classifications go into more detail.
- **Trade:** the third type of classification system is used to distinguish between different types of product that are traded. Trade classification systems are used to record quantities and values of trade and are used by customs authorities to implement trade policies such as phytosanitary regulations, product regulations and tariffs. Although similar to product classification systems, classification systems for trade often go into much more detail.

All classification systems are organised into hierarchies that go into varying levels of detail. The different levels of detail are given names such as: sections; chapters; divisions; groups; and classes. They can be coded using letters, numbers or a combination of the two. When they are coded using numbers, it is common to refer to the level of detail in any presentation of the statistics as the “digit-level”. Higher digit levels refer to greater levels of detail and digit levels sometimes increase by a factor of two (i.e. the 2-digit level is the broadest classification and an 8-digit or 10-digit level is much more detailed).

Although there have been many efforts to try to standardise classification systems, some variation still exists between most countries. In particular, many of the largest economies in the World still maintain their own national classification systems, although many also provide tables of cross-references to assist with reclassifying their statistics into a comparable international format. In addition, some regional groups of countries have developed standardised classification systems between themselves. A brief description of some of the major classification systems in use around the World is given in Table 1.

Table 1 Examples of some of the main classification systems used in national statistics

Region	Name, version (and abbreviation)	Status	Main purpose	Notes
Global	International Standard Industrial Classification of All Economic Activities, Revision 3.1 (ISIC Rev. 3.1)	Draft	A	Will replace ISIC Rev. 3. Goes to 4-digit level (4 levels)
	Central Product Classification, Version 1.1 (CPC 1.1)	Draft	P/T	Will replace CPC 1.0.
	Standard International Trade Classification, Third Revision (SITC Rev.3)	Current	T	HS 2002 is used for international trade and tariff statistics to 6-digit level (3 levels). This is extended to 10-digit level (5 levels) by countries. Some countries still use earlier systems.
	Harmonized Commodity Description and Coding System 1996 (HS 1996)	Current	T	
	Harmonized Commodity Description and Coding System 2002 (HS 2002)	Current	T	
Europe	Statistical Classification of Economic Activities in the European Community, Revision 1.1 (NACE Rev. 1.1)	Current	A	EU version of ISIC, giving more detail.
	Statistical Classification of Products by Activity in the European Economic Community, 2002 Version (CPA 2002)	Current	P	EU version of CPC, giving more detail.
	PRODCOM list (List of PRODUcts of the European COMMunity), 2003 version (PRODCOM List 2003)	Current	P	Used to link CPA with CN and HS.
	Combined Nomenclature, 2003 (CN 2003)	Current	P/T	Used for trade in EU, to go from 6-digit HS 1996 to 8 digits.
North America	North American Industry Classification System (NAICS)	Current	A	Used in USA, Canada and Mexico.
Asia-Pacific	Standard Industrial Classification for Japan (JSIC)	Current	A	
	Australian and New Zealand Standard Industrial Classification (ANZSIC)	Current	A	
	The Australian and New Zealand Standard Product Classification (ANZSPC)	Current	P	

Source: RAMON - Eurostat's Classifications Server, 2003 (available at: <http://europa.eu.int/comm/eurostat/ramon>). Note: for main purpose; A = systems used to classify economic activities; P = product classifications; and T = trade classification systems.

Seed production statistics

If available, statistics on the production of forest seeds, other seeds and other forest plant material would be found in statistics that are classified using either a classification of economic activities or a product classification system. The availability of such statistics in some of the main classification systems is described below.

International Standard Industrial Classification of all economic activities, Revision 3.1

The International Standard Industrial Classification of all economic activities, Revision 3.1 (ISIC Rev. 3.1) is divided into four levels of detail, called; sections; divisions; groups; and classes. The fundamental level of detail in ISIC Rev. 3.1 is the division, which is represented

by a 2-digit code. Sections are used to group together similar activities (defined at the level of the division) and are identified by a letter. They can be used present information at broader level of detail. Below the division level, ISIC Rev. 3.1 is further sub-divided into groups (3-digit code) and classes (4-digit code).

Forestry occurs as a separate economic activity at the division level in ISIC Rev. 3.1 and forms part of Section A (agriculture, hunting and forestry). However, different activities within the forestry sector are not identified separately at higher digit levels (i.e. groups and classes). In other words, the forestry sector division contains only one group and only one class. The position of the forestry sector within the ISIC Rev. 3.1 hierarchy is shown in Table 2 below.

Table 2 The position and classification of the forestry sector in ISIC Rev. 3.1

Section	Division	Group	Class	Description
A				AGRICULTURE, HUNTING & FORESTRY
	01			Agriculture, hunting & related service activities
		011		Growing of crops; market gardening; horticulture
			0111	Growing of cereals & other crops n.e.c.
			0112	Growing of vegetables, horticulture, nursery
			0113	Growing of fruit, nuts, beverage & spice crops
		012		Farming of animals
			0121	Farming of cattle, sheep, horses, dairy farming
			0122	Other animal farming, animal products
		013	0130	Mixed farming (crops & animals)
		014	0140	Agriculture & animal husbandry services (except veterinary)
		015	0150	Hunting, trapping, game propagation & related services
	02	020	0200	Forestry, logging & related service activities

Source: UN Classifications registry (at: <http://millenniumindicators.un.org/unsd/cr/registry/regcst.asp?Cl=17&Lg=1>).

Class 0200 (forestry, logging and related service activities) includes the following activities:

- growing of standing timber: planting, replanting, transplanting, thinning and conserving of forests and timber tracts;
- growing of coppice and pulpwood;
- operation of forest tree nurseries;
- growing of Christmas trees;
- logging: felling of timber and production of wood in the rough such as pit-props, split poles, pickets or fuel wood;
- forestry service activities: forestry inventories, timber evaluation, fire fighting and protection, forest management including afforestation and reforestation;
- logging service activities: transport of logs within the forest;
- production of charcoal, when done in the forest; and
- gathering of wild growing forest materials, except mushrooms, truffles, berries or nuts: balata and other rubber-like gums, cork, lac, resins, balsams, vegetable hair, eelgrass, acorns, horse-chestnuts, mosses, lichens.

The production of forest seeds and other forest plant material is included in Class 0200 (operation of forest tree nurseries), but it would not be possible to use any national statistics organised according to ISIC Rev. 3.1 to identify this separately from other forestry activities.

Similarly, ISIC Rev. 3.1 does not go into sufficient detail to identify seed production in the rest of the agricultural sector.

ISIC Rev. 3.1 is currently being revised (to produce ISIC Rev. 4). There is a proposal to create one or more separate classes for seed production under the group: “agriculture and animal husbandry services (except veterinary)”, but this may not be accepted. There are also proposals to sub-divide the forestry sector into more groups and classes, but none of these includes a proposal to create a separate class for seed production.

Central Product Classification Version 1.1

The Central Product Classification Version 1.1 (CPC 1.1) constitutes a comprehensive classification of all goods and services. CPC 1.1 presents categories for all products that can be the object of domestic or international transactions or that can be entered into stocks. It includes products that are an output of economic activity, including transportable goods, non-transportable goods and services. CPC 1.1 was developed to serve as an instrument for assembling and tabulating all kinds of statistics requiring product detail. Such statistics may cover production, intermediate and final consumption, capital formation, foreign trade or prices. They may refer to commodity flows, stocks or balances and may be compiled in the context of input/output tables, balance of payments and other analytical presentations. CPC 1.1 classifies products based on the physical characteristics of goods or on the nature of the services rendered. It was developed primarily to enhance harmonization among various fields of economic and related statistics and to strengthen the role of national accounts as an instrument for the coordination of economic statistics. It provides a basis for recompiling basic statistics from their original classifications into a standard classification for analytical use. CPC 1.1 consists of: 10 "Sections" (1-digit level); 70 "Divisions" (2-digit level); 305 "Groups" (3-digit level); 1,167 "Classes" (4-digit level); and 2,096 "Subclasses" (5-digit level).

The forestry sector appears in CPC 1.1 as one of the divisions under Section 0 (agriculture, forestry and fishery products). The forestry sector is further sub-divided into three groups and 10 classes and sub-classes (i.e. each class has only one sub-class). None of the individual sub-classes in CPC 1.1 mentions the production of forest seeds. Furthermore, it is not readily apparent where forest seeds may be put under this classification system. Based on the titles of the sub-classes, sub-class 03920 would be the most obvious candidate, but the title of this sub-class suggests that it should only include ornamental plants. Therefore, it would not be possible to collect information about forest seed production in statistics prepared according to CPC 1.1, due to the lack of detail and ambiguity about where it may be placed.

The situation with respect to agricultural and horticultural seeds is not much better. There are possibly seven sub-classes where seeds and planting material may comprise a significant proportion of the sub-class (shown in bold and underlined in Table 3). However, by far the most important component of seed production is the production of seeds for cereal crops. Because these seeds are also the consumed product (and are included as such), it is not possible to use CPC 1.1 to obtain total agricultural seed production.

Table 3 The position and classification of the forestry sector in CPC 1.1 under Section 0 (agriculture, forestry and fishery products)

Div.	Group	Class	S-C	Description
01				PRODUCTS OF AGRICULTURE, HORTICULTURE AND MARKET GARDENING
	011			Cereals
		0111	01110	Wheat and meslin
		0112	01120	Maize (corn)
		0113	01130	Rice, not husked
		0114	01140	Husked rice
		0115	01150	Barley
		0116	01160	Rye, oats
		0119	01190	Other cereals
	012			Vegetables
		0121	01210	Potatoes
		0122	01220	Dried leguminous vegetables, shelled
		0123		Other vegetables, fresh or chilled
			01231	Locust beans
			01239	Other vegetables, fresh or chilled n.e.c.
		0124	01240	Edible roots and tubers with high starch or inulin content
	013			Fruit and nuts
		0131	01310	Dates, figs, bananas, coconuts, brazil nuts, pineapples, avocados, mangoes, guavas, mangosteens, fresh or dried
		0132	01320	Citrus fruit, fresh or dried
		0133	01130	Grapes, fresh
		0134		Other fruit, fresh
			01341	Melons
			01349	Other fruit, fresh n.e.c.
		0135	01350	Other fruit, dried
		0136	01360	Other nuts, fresh or dried, whether or not shelled
	014			Oil seeds and oleaginous fruit
		0141	01410	Soya beans
		0142	01420	Ground nuts
		0143	01430	Sunflower, sesamum, safflower, rape, colza and mustard seeds
		0144	01440	Cotton seeds
		0149	01490	Oil seeds n.e.c. and oleaginous fruit
	015			Living plants; cut flowers and flower buds; flower seeds and fruit seeds; vegetable seeds
		0151	01510	Live plants; bulbs, tubers and roots; cuttings and slips; mushroom spawn
		0152	01520	Cut flowers and flower buds including bouquets, wreaths, floral baskets and similar articles
		0153	01530	Flower seeds and fruit seeds
		0154	01540	Vegetable seeds, except beet seeds
	016			Beverages and spice crops
		0161		Beverage crops
			01611	Coffee, not roasted, not decaffeinated
			01612	Green tea (not fermented), black tea (fermented) and partly fermented tea, in immediate packing of a content exceeding 3 kg
			01613	Mate
			01614	Cocoa beans, raw or roasted
		0162	01620	Spices, whether or not processed
	017			Unmanufactured tobacco
		0171	01710	Cured stemmed/stripped tobacco leaves
		0179	01790	Other unmanufactured tobacco

Div.	Group	Class	S-C	Description	
(01)	018			Plants used for sugar manufacturing	
		0181	01810	Sugar beet	
		0182	01820	Sugar cane	
	019				Raw vegetable materials n.e.c.
		0191	01910		Cereal straw and husks, unprepared, whether or not chopped, ground, pressed or in the form of pellets; swedes, mangols, fodder roots, hay, clover, sainfoin, forage, kale, lupines, vetches and similar forage products, whether or not in the form of pellets
		0192			Raw vegetable materials used in textile
			01921		Cotton, whether or not ginned
			01922		Jute and other textile bast fibres, raw or retted, except flax, true hemp and ramie
		01923		Flax and true hemp, raw or retted; sisal and other textile fibres of the genus <i>Agave</i> , raw; coconut, abaca, ramie and other vegetable textile fibres, raw	
0193	01930		<u>Plants and parts of plants used primarily in perfumery, in pharmacy, or for insecticidal, fungicidal or similar purposes</u>		
0194	01940		<u>Sugar beet seeds, other beet seeds and seeds of forage plants</u>		
0199	01990		<u>Other raw vegetable materials</u>		
02				LIVE ANIMALS AND ANIMAL PRODUCTS	
	...			2 groups	
		...		11 classes	
			...	21 sub-classes	
03				FORESTRY AND LOGGING PRODUCTS	
	031			Wood in the rough	
		0311	03110	Logs of coniferous wood	
		0312	03120	Logs of non-coniferous wood	
		0313	03130	Fuel wood, in logs, in billets, in twigs, in faggots or in similar forms	
		0319	03190	Other wood in the rough (including split poles and pickets)	
	032			Natural gums	
		0321	03210	Natural rubber in primary forms or in plates, sheets or strip	
		0322	03220	Balata, gutta-percha, guayule, chicle and similar natural gums	
		0323	03230	Lac; other natural gums, resins and other vegetable saps and extracts	
	039			Other forestry products	
		0391	03910	Natural cork, raw or simply prepared	
		0392	03920	<u>Parts of plants, without flowers or flower buds, and grasses, mosses and lichens, suitable for ornamental purposes</u>	
		0393	03930	Vegetable materials of a kind used primarily for plaiting or as stuffing or padding; raw vegetable materials of a kind used primarily for dyeing or tanning; vegetable products n.e.c.	
04				FISH AND OTHER FISHING PRODUCTS	
	...			3 groups	
		...		8 classes	
			...	8 sub-classes	

Source: United Nations, 2002, Central Product Classification: CPC Version 1.1, Draft Paper ESA/STAT/SER.M/77/Ver.1.1 submitted to the United Nations Statistical Commission, 5-8 March 2002.

Available at: <http://unstats.un.org/unsd/statcom/doc02/cpc.pdf>.

North American Industry Classification System

The North American Industry Classification System (NAICS) provides common industry definitions for Canada, Mexico and the United States, to facilitate economic analyses that cover the economies of the three North American countries. NAICS is organised into a hierarchy of five different levels and contains the following: 20 Level 1 Categories (2-digit level); 70 Level 2 Categories (3-digit level); 223 Level 3 Categories (4-digit level); and 460 Level 4 Categories (5-digit level). Some Level 4 Categories are further sub-divided to the

6-digit level. The basic structure of NAICS is broadly comparable with the 2-digit level of ISIC Rev. 3.1.

Table 4 The position and classification of the forestry sector in NAICS

2002 NAICS Codes		2002 NAICS Title
11		AGRICULTURE, FORESTRY, FISHING AND HUNTING
	111	Crop Production
	1111	Oilseed and Grain Farming
	11111	111110 Soybean Farming
	11112	111120 Oilseed (except Soybean) Farming
	11113	111130 Dry Pea and Bean Farming
	11114	111140 Wheat Farming
	11115	111150 Corn Farming
	11116	111160 Rice Farming
	11119	Other Grain Farming
		111191 Oilseed and Grain Combination Farming
		111199 All Other Grain Farming
	1112	Vegetable and Melon Farming
	11121	Vegetable and Melon Farming
		111211 Potato Farming
		111219 Other Vegetable (except Potato) and Melon Farming
	1113	Fruit and Tree Nut Farming
	11131	111310 Orange Groves
	11132	111320 Citrus (except Orange) Groves
	11133	Non-citrus Fruit and Tree Nut Farming
		111331 Apple Orchards
		111332 Grape Vineyards
		111333 Strawberry Farming
		111334 Berry (except Strawberry) Farming
		111335 Tree Nut Farming
		111336 Fruit and Tree Nut Combination Farming
		111339 Other Non-citrus Fruit Farming
	1114	Greenhouse, Nursery, and Floriculture Production
	11141	Food Crops Grown Under Cover
		111411 Mushroom Production
		111419 Other Food Crops Grown Under Cover
	11142	Nursery and Floriculture Production
		111421 Nursery and Tree Production
		111422 Floriculture Production
	1119	Other Crop Farming
	11191	111910 Tobacco Farming
	11192	111920 Cotton Farming
	11193	111930 Sugarcane Farming
	11194	111940 Hay Farming
	11199	All Other Crop Farming
		111991 Sugar Beet Farming
		111992 Peanut Farming
		111998 All Other Miscellaneous Crop Farming

2002 NAICS Codes					2002 NAICS Title	
(11)	112	Animal Production (includes 41 sub-divisions)	
	113				Forestry and Logging	
		1131	11311	113110	Timber Tract Operations	
		1132	11321	113210	Forest Nurseries and Gathering of Forest Products	
		1133	11331	113310	Logging	
	114	Fishing, Hunting and Trapping (includes 8 sub-divisions)	
	115				Support Activities for Agriculture and Forestry	
		1151	11511			Support Activities for Crop Production
				115111	Cotton Ginning	
				115112	Soil Preparation, Planting, and Cultivating	
				115113	Crop Harvesting, Primarily by Machine	
				115114	Post harvest Crop Activities (except Cotton Ginning)	
				115115	Farm Labour Contractors and Crew Leaders	
		115116	Farm Management Services			
		1152	11521	115210	Support Activities for Animal Production	
1153	11531	115310	Support Activities for Forestry			

Source: US Census Bureau, 2002, 2002 NAICS Codes and Titles (at: <http://www.census.gov/epcd/naics02/naicod02.htm>).

Forestry is identified as a separate activity at the second level of the hierarchy (3-digit level), as part of “agriculture, forestry, fishing and hunting”. It is further sub-divided into three categories at the 4-digit level, but is not sub-divided beyond this (see Table 4). Forest seeds and other plant material production would be included under NAICS Code 1132 (forest nurseries and gathering of forest products). However, this category is defined as follows:

“This industry comprises establishments primarily engaged in (1) growing trees for reforestation and/or (2) gathering forest products, such as gums, barks, balsam needles, rhizomes, fibers, Spanish moss, ginseng, and truffles”.

Thus, NAICS Code 1132 includes more than just seeds and plant material production and could not be used to obtain statistics about this. (NAICS Code 111421 - nursery and tree production - comprises establishments primarily engaged in (1) growing nursery products, nursery stock, shrubbery, bulbs, fruit stock, sod, and so forth, under cover or in open fields and/or (2) growing short rotation woody trees with a growth and harvest cycle of 10 years or less for pulp or tree stock. The latter is mostly used to capture Christmas tree production).

In addition, it would not be possible to use statistics arranged using NAICS to obtain information about seed production in agriculture. Under agriculture, the definitions of each industry sector specifically include the production of seed materials along with the production of the consumed product (e.g. seed potato production is included in NAICS Code 111211 - potato farming).

FAO databases

FAO maintains various databases of agricultural and forestry statistics (called FAOSTAT). The data contained therein is collected from governments using annual questionnaires.

The forestry databases do not contain any information about forest tree seed production or the production of other plant material. However, FAOSTAT does have several databases of agricultural production, one of which includes seed production. Agricultural products in these databases are arranged according to FAO’s “Definition and Classification of Commodities”

(for further details, see: <http://www.fao.org/ES/faodef/FAODEFE.HTM>). This classification system defines 193 primary crops (and groups of primary crops).

The definition of seed used by FAO is as follows:

“Data include the amounts of the commodity set aside for sowing or planting (or generally for reproduction purposes, e.g., sugar cane planted, potatoes for seed, eggs for hatching, etc.) during the year. Account is taken of double or successive sowing or planting whenever it occurs.

The data of seed include also, when it is the case, the quantities necessary for sowing or planting the area relating to that part of crop products to be harvested green or used for fodderstuff (e.g., green peas, green beans, maize for forage, rye grass, legumes for forage, cabbage for fodder, etc.), or in another form (e.g. dry pulses used for green pulses production). Data for seed element are stored in metric tons (MT)”.

Information about agricultural seed production is given in the “Agricultural crops: primary crops” database and is available for the following crops:

- **Cereals:** wheat; paddy rice; barley; maize; rye; oats; millet; sorghum; buckwheat; quinoa; fonio; triticale; canary seed; mixed grain; and cereals nes.
- **Fibre crops:** none (except seed cotton - included under “oilcrops” below).
- **Fruit:** none (except watermelons - also included under “vegetables” below).
- **Oilcrops:** soybeans; groundnuts; coconuts; castor beans; sunflower seed; rapeseed; safflower seed; sesame seed; mustard seed; poppy seed; melon seed; seed cotton; cotton seed; linseed; hempseed; and oilseeds nes.
- **Pulses:** beans; broad beans; peas; chick-peas; cow peas; pigeon peas; lentils; vetches; lupins; and pulses nes.
- **Roots and tubers:** potatoes; sweet potatoes; cassava; yautia (cocoyam); taro (coco yam); yams; and roots and tubers nes.
- **Tree nuts:** nuts nes.
- **Vegetables:** cabbages; onions and shallots, green; onions, dry; garlic; carrots; okra; green corn (maize); vegetables fresh nes; and watermelons.
- **Sugar crops:** sugar cane.

Statistics on agricultural seed production for the year 2002 are given in Table 5 below (tree nuts are excluded from this table because only one country reported this and it was a very small amount). The statistics show total agricultural seed production in 2002 of 204 million tonnes. However, it must be noted that these statistics appear to be only partial for many countries and many of them are FAO estimates. Furthermore, these statistics do not include seed production for horticultural use (although the amounts are only likely to be small). They also do not include any information about the total value of seed production.

Table 5 FAOSTAT statistics on agricultural seed production in 2002 (in MT)

Country	All primary crops	Cereals	Oilcrops	Roots and tubers	Vegetables	Pulses	Sugar cane
Afghanistan	202,712	185,435 F	1,057 F	14,000 F		2,220 F	
Albania	62,391	24,932	71	33,000		4,388	
Algeria	267,608	194,146 F	2	70,620 F		2,840 F	
Angola	34,303	17,568 F	985 F	9,000 F		6,750 F	
Antigua and Barbuda	3		3 F				
Argentina	861,957	617,330 F	139,684	77,583 F		27,360 F	
Armenia	182,780	50,610		132,000		170	
Australia	962,675	701,940 F	4,232 F	125,000 F		131,503 F	
Austria	181,986	121,800	426 F	55,000 F		4,760	
Azerbaijan, Republic of	305,128	174,008	720 F	130,400			
Bahamas	11	7 F				4 F	
Bangladesh	891,818	629,357 F	4,600 F	248,988 F		8,873 F	
Barbados	46	26 F				20 F	
Belarus	2,751,700	718,500 F	4,200 F	2,000,000 F		29,000 F	
Belgium-Luxembourg	139,351	63,860 F	577 F	73,000 F		1,914 F	
Belize	1,071	811 F				260 F	
Benin	554,143	18,971 F	5,834 F	525,113 F		4,225 F	
Bhutan	6,642	3,472 F	10 F	3,100 F		60 F	
Bolivia	247,324	37,657	9,773	197,033		2,861 F	
Bosnia and Herzegovina	64,806	48,932 F	23 F	15,000 F		851 F	
Botswana	3,977	3,092 F	47 F			838 F	
Brazil	1,346,507	768,795 F	125,918 F	275,407 F	7,545 F	168,842 F	
Brunei Darussalam	20	20 F					
Bulgaria	316,207	229,748	5,599	78,000 F		2,860	
Burkina Faso	72,777	57,105 F	1,319 F			1,753 F	12,600 F
Burundi	36,197	6,410 F	287	10,000 F		19,500 F	
Cambodia	165,728	150,938	624 F			1,280 F	12,886
Cameroon	152,615	27,230 F	9,885 F	69,600 F		12,150 F	33,750 F
Canada	2,162,557	1,610,660 F	35,823 F	305,000 F	14,360 F	196,714 F	
Cape Verde	3,410		0	210 F		3,200 F	
Central African Republic	55,135	7,030 F	3,135 F	40,195		1,650 F	3,125 F
Chad	63,392	34,625 F	14,028 F	5,000 F		9,739 F	
Chile	180,264	90,755 F	65	84,000 F		5,444 F	
China, Mainland	13,438,613	9,597,175	617,238 F	3,000,000 F		224,200 F	
China, Taiwan Prov of	19,831	16,260 F	1,311 F	1,854 F		406 F	
Colombia	271,518	92,672	1,092	170,000 F		7,754	
Comoros	2,692	1,862 F	20 F			810 F	
Congo, Dem Republic of	166,176	85,274	14,638	24,217 F		11,044	31,003 F
Congo, Republic of	2,125	206 F	862 F	507		550 F	
Costa Rica	38,125	4,109	1 F	3,149 F		866 F	30,000 F
Côte d'Ivoire	770,569	91,146 F	4,843 F	673,800 F		780 F	
Croatia	195,128	96,626	526	96,960		1,016 F	
Cuba	25,916	9,513 F	338	13,258 F		2,807 F	
Cyprus	28,708	13,200 F	35 F	15,300 F		173 F	
Czech Republic	503,295	352,330	1,543	140,000 F		9,422	
Denmark	399,377	294,520 F	1,707	96,000		7,150 F	
Dominica	3,126	3 F		3,109 F		14 F	
Dominican Republic	22,833	17,577 F	40	2,920 F		2,296 F	
Ecuador	182,269	55,136	1,886	84,432 F	37,702 F	3,113	
Egypt	2,105,309	277,869 F	6,610 F	238,087		32,743 F	1,550,000 F
El Salvador	172,883	5,011 F	320 F	750 F		3,827 F	162,975 F
Eritrea	21,068	11,818	276	4,250 F		4,724	
Estonia	158,631	82,531		75,000 F		1,100 F	
Ethiopia	413,497	255,128 F	4,574 F	76,450 F		77,345 F	
Fiji Islands	683	586 F	7 F	10 F		80 F	
Finland	362,654	293,554		67,900 F		1,200 F	

Country	All primary crops	Cereals	Oilcrops	Roots and tubers	Vegetables	Pulses	Sugar cane
France	1,702,299	1,289,079	7,568 F	340,000		65,652 F	
French Guiana	496	496 F					
French Polynesia	100			100 F			
Gabon	5,657	530 F	368 F	4,750 F		9 F	
Gambia	7,086	4,665 F	1,901 F			520 F	
Gaza Strip (Palestine)	70	70 F					
Georgia	119,812	35,712 F	4,100 F	80,000 F			
Germany	1,862,955	1,153,939	2,044	663,000 F		43,972	
Ghana	56,293	40,294 F	9,549 F			2,250 F	4,200 F
Greece	366,855	240,550	7,688 F	115,000		3,617 F	
Grenada	8	6 F	0 F			2 F	
Guatemala	33,934	21,478 F	175 F	5,000 F	60 F	7,221 F	
Guinea	49,151	31,332 F	3,569 F	3,000 F		3,150 F	8,100 F
Guinea-Bissau	7,233	6,622 F	389 F			222 F	
Guyana	12,099	12,052 F	26			21	
Haiti	19,699	14,820 F	347 F	860 F		3,672 F	
Honduras	143,936	7,387 F	18 F	2,486 F		5,045 F	129,000 F
Hungary	531,200	423,772	8,308	72,000 F		27,120	
Iceland	800			800 F			
India	33,861,872	12,368,000 F	264,571 F	2,100,000 F		715,299 F	18,414,002 F
Indonesia	646,752	549,000 F	14,752 F	55,000 F		28,000 F	
Iran, Islamic Rep of	1,276,876	995,800 F	3,866 F	175,000 F		102,210 F	
Iraq	355,470	280,844 F	558 F	72,380 F		1,688 F	
Ireland	63,055	41,526 F	19 F	21,000 F		510 F	
Israel	21,145	13,093 F	666 F	6,000 F		1,386	
Italy	1,074,286	848,350	4,486	190,000 F	12,000 F	19,450	
Jamaica	891	28 F		650 F		213 F	
Japan	348,233	97,251	1,431	245,501 F		4,050	
Jordan	15,157	11,319	44 F	3,502 F		292	
Kazakhstan	2,075,494	1,631,208 F	7,871 F	330,000 F	101,785 F	4,630 F	
Kenya	194,580	69,730 F	850 F	96,000 F		28,000 F	
Korea, Dem People's Rep	172,236	95,038 F	4,670 F	44,528 F		28,000 F	
Korea, Republic of	96,336	56,930	1,051	37,000 F		1,355	
Kuwait	1,311	126 F		1,185			
Kyrgyzstan	221,001	19,817	1,184 F	200,000 F			
Laos	150,863	145,500 F	403 F	4,400 F		560 F	
Latvia	293,608	97,906	92	194,568 F		1,042	
Lebanon	20,266	7,695 F	51 F	11,900		620 F	
Lesotho	6,315	5,351 F				964 F	
Liberia	15,613	7,500 F	188 F			275 F	7,650 F
Libyan Arab Jamahiriya	82,428	51,586 F	360	30,000 F		482	
Lithuania	685,502	218,500 F	2,702 F	450,000 F	6,200 F	8,100 F	
TFYR Macedonia	70,646	41,792 F	39 F	26,000 F		2,815 F	
Madagascar	230,019	103,572 F	1,236 F	74,550 F		6,193 F	44,468 F
Malawi	153,047	41,300	5,235 F	69,424 F		37,088 F	
Malaysia	23,507	20,139 F	38	3,330 F			
Maldives	4	0 F				4 F	
Mali	142,578	128,214 F	14,337 F			27 F	
Malta	1,953	404		1,498 F		51 F	
Mauritania	8,086	3,073 F	53 F	160 F		4,800 F	
Mauritius	1,629	1	3 F	1,625 F			
Mexico	688,178	546,230 F	3,800 F	51,600 F		86,548 F	
Moldova, Republic of	245,761	112,562	699	130,000 F		2,500 F	
Mongolia	46,221	36,159		10,000 F		62 F	
Morocco	593,466	476,814	994	97,784 F		17,874 F	
Mozambique	79,925	49,251 F	7,274 F	6,200 F		17,200 F	
Myanmar	974,639	691,610 F	27,719 F	17,591 F		111,052 F	126,667 F

Country	All primary crops	Cereals	Oilcrops	Roots and tubers	Vegetables	Pulses	Sugar cane
Namibia	6,451	5,765 F	11 F			675 F	
Nepal	452,572	173,000	833 F	149,000 F		10,785 F	118,954 F
Netherlands	457,475	56,500		400,000 F		975 F	
New Caledonia	125	3 F		120 F		2 F	
New Zealand	79,849	22,232	12 F	51,605 F		6,000	
Nicaragua	25,354	15,490 F	335 F	1,075 F		8,454 F	
Niger	256,965	132,259 F	3,042 F	164 F		121,500 F	
Nigeria	11,953,991	513,302 F	78,699 F	11,164,250 F		182,800 F	14,940 F
Norway	100,510	61,240	20 F	39,250 F			
Oman	129	129 F					
Pakistan	6,298,992	1,298,300	25,737 F	105,200		65,595	4,804,160 F
Panama	19,384	8,275 F	2 F	2,800 F		307 F	8,000 F
Papua New Guinea	662	104 F	22 F	104 F		432 F	
Paraguay	57,378	38,935 F	13,547 F	168 F		4,728 F	
Peru	444,583	92,566 F	510	317,035 F	25,000 F	9,472 F	
Philippines	1,369,995	336,365	18,202 F	38,727 F		1,701	975,000 F
Poland	4,146,297	2,069,000	16,590 F	2,050,000 F		10,707 F	
Portugal	197,178	75,000 F	361	120,043 F		1,774 F	
Réunion	442	100 F	12 F	210 F		120 F	
Romania	1,544,253	707,526 F	5,067	830,000 F		1,660	
Russian Federation	20,946,447	12,154,800 F	118,797 F	8,500,000 F		172,850 F	
Rwanda	120,021	8,031	522 F	99,978 F		11,490 F	
Saint Kitts and Nevis	8		0 F			8 F	
Saint Lucia	1					1 F	
Saint Vincent/Grenadines	42	12 F	3			27 F	
Samoa	1				1 F		
Sao Tome and Principe	2,530	30 F		2,500 F			
Saudi Arabia	95,260	55,040 F		40,040 F		180 F	
Senegal	69,309	38,556 F	27,614 F	400 F		2,739 F	
Serbia and Montenegro	474,436	266,178	1,476 F	203,406 F		3,376	
Sierra Leone	24,352	20,632 F	454 F			3,266 F	
Slovakia	191,306	129,944	827 F	58,680 F		1,855 F	
Slovenia	29,189	14,759 F	0 F	14,400 F		30	
Solomon Islands	291	117 F				174 F	
Somalia	21,450	15,908 F	582 F			4,960 F	
South Africa	216,921	136,936 F	5,047	67,200 F		7,738	
Spain	1,304,063	1,071,302 F	1,801 F	180,000 F		50,960 F	
Sri Lanka	108,645	82,871 F	212	8,100 F	16,950 F	512 F	
Sudan	170,031	149,727	11,612 F	2,100 F		6,592	
Suriname	8,007	8,001 F	6 F				
Swaziland	4,456	2,248 F	190 F	1,800 F		218 F	
Sweden	317,679	233,000	155	78,000 F		6,524	
Switzerland	62,838	31,100	20 F	31,000		718	
Syrian Arab Republic	452,506	399,236	2,696 F	28,921 F		21,653 F	
Tajikistan	63,070	38,750 F	1,920 F	22,000 F		400 F	
Tanzania, United Rep of	212,639	86,038 F	3,876 F	64,000 F		25,725 F	33,000 F
Thailand	778,490	746,580 F	4,080 F	6,930 F		20,900 F	
Timor-Leste	1,468	1,215 F	74 F	179 F			
Togo	78,510	19,677 F	2,020 F	53,948 F		2,865 F	
Tonga	4		4 F				
Trinidad and Tobago	205	155 F				50 F	
Tunisia	142,653	110,600 F	100 F	25,000 F		6,953 F	
Turkey	3,011,148	2,516,596 F	15,072 F	320,000 F		159,480 F	
Turkmenistan	106,200	98,000 F	7,200 F	1,000 F			
Uganda	157,952	45,950 F	7,060 F	58,400 F		46,542 F	
Ukraine	7,598,805	2,475,700 F	15,105 F	5,000,000 F		108,000 F	
United Kingdom	926,498	479,000	2,498 F	399,000 F		46,000	

Country	All primary crops	Cereals	Oilcrops	Roots and tubers	Vegetables	Pulses	Sugar cane
United States of America	7,061,927	3,480,943	487,914	1,275,400		55,000	1,762,670
Uruguay	67,560	55,567 F	1,073	10,430		490 F	
Uzbekistan	317,534	243,470	12,564 F	60,000 F		1,500 F	
Vanuatu	30,594	65 F	79 F	30,450 F			
Venezuela, Boliv Rep of	64,671	25,484 F	5,844 F	32,102 F		1,241 F	
Viet Nam	49,784,269	1,042,165 F	361 F	47,375,314 F		20,549 F	1,345,880 F
Wallis and Futuna Is	16				16 F		
Yemen	30,844	25,751 F	3,893 F	1,200 F			
Zambia	31,214	20,573 F	5,981 F	2,100 F		2,560 F	
Zimbabwe	48,602	42,468 F				6,134	
TOTAL	203,988,146	73,375,165	2,355,820	94,733,303	221,619	3,669,209	29,633,030

Source: FAO, 2004 (available at: <http://apps.fao.org/default.htm>). Note: F = FAO estimate.

Seed trade statistics

There are also a number of different classifications systems used around the World to record trade in goods and services. However, because of the cross-border nature of international trade, greater efforts have been made to develop and adopt international standards. The most common classification systems used to record international trade statistics are as follows:

- Standard International Trade Classification, Third Revision (SITC Rev. 3);
- Harmonized Commodity Description and Coding System 1996 (HS 1996); and
- Harmonized Commodity Description and Coding System 2002 (HS 2002).

The majority of countries have now adopted one of these international classification systems in preference to their national system. The most commonly used classification system at the moment is probably HS 1996 (which replaced SITC Rev. 3), although it is anticipated that more countries will start to use HS 2002 over time.

Harmonized Commodity Description and Coding System 1996

The Harmonized System (HS 1996) was developed under the auspices of the Customs Cooperation Council. It is based on a fundamental principle that goods are classified by what they are and not according to their stage of fabrication, use, country of origin or any other such criteria. The Harmonized System is logically structured by economic activity or component material. For example, animals and animal products are found in one section; machinery and mechanical appliances (which are grouped by function) are found in another.

HS 1996 is divided into 21 Sections, which, in general, group goods produced in the same sector of the economy. For example, Section IV, "Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco Substitutes" (i.e. agricultural products) and Section VI, "Products of the Chemical or Allied Industries" etc. (i.e. chemical products, etc.).

Each Section contains one or more Chapters (with 97 Chapters in total). The Chapters of Sections I to XV (except Section XII) are grouped by biological genus (e.g. Section I, Chapters 1-5 Live Animals, Animal products, fish, Dairy products etc.) or by the component

material from which articles are wholly or mainly made (e.g. Section VIII contains Chapter 41 - Raw Hides and Skins; and Chapter 42 - Articles of Leather, etc.).

In Sections I to XV (except Section XII), the groups of products formed according to their basic material are structured or divided in two ways:

Horizontal - For the groups of products formed according to their basic material, there is no apparent hierarchical order (e.g. Chapter 39 - "Plastics and Articles Thereof"; Chapter 44 - "Wood and Articles of Wood"); i.e. there is no discernable reason that plastic should precede wood.

Vertical - For those chapters in which goods are grouped by raw material, there is a vertical structure in which articles are often classified according to their degree of processing. For example, Chapter 44 contains items such as rough wood, wood roughly squared and some wooden finished products such as wooden tableware.

Articles may also be classified according to their use or function. This classification (i.e. by function), mainly occurs in Section XII and Sections XVI - XXI.

The basic hierarchical structure of HS 1996 is organised as follows:

Sections:	groups of Chapters (identified by capitalised roman numerals)
Chapters:	2-digit code
Headings:	4-digit code
Sub-headings:	6-digit code
Tariff Items:	8-digit code
Statistical Annotations:	10-digit code

In the presentation of statistics, HS codes are also sometimes written in groups of two digits separated by a period “.”.

HS 1996 has a 6-digit “root” that is common to all countries. This has also been expanded to a common 8-digit “root” for a few products. In a few places, similar products are also grouped together at an odd numbered digit level (e.g. all seeds of forage plants start with the 5-digit code “12092”).

Statistics on trade in forest seeds and other forest plant material would not appear along with other forest products in HS 1996, but would be found in Chapters 12 and 6 respectively. Although such materials are not explicitly described in HS 1996, they would possibly occur in several places (shown in bold and underlined in Table 6).

For statistics on forest seeds, the most common species used in forest tree planting would most likely be recorded under Sub-heading 120999 (seeds, fruit and spores for sowing, not elsewhere specified). With the exception of fruit seeds, this sub-heading should only include tree seeds, because all other types of seeds used in agriculture and horticulture are included elsewhere in HS 1996. Some tree seeds may also be recorded under Sub-heading 121190 (but species under this sub-heading are not likely to be common forest species - e.g. Neem).

For statistics on other forest plant material, unrooted cuttings (e.g. poplars and willow) should occur as part of Sub-heading 060210 (unrooted cuttings and slips) and as part of the Tariff

Item 06029090 (plants, live (including their roots), nes). Fruit and nut trees should be under Sub-heading 060220 (trees, shrubs and bushes, grafted or not, of kinds which bear edible fruit or nuts). Again, some forest plant material may also be recorded under Sub-heading 121190.

Table 6 The position and classification of seeds and other plant material in HS 1996 under Section II (vegetable products)

Chapter	Heading	Sub-heading	Tariff Item	HS 1996 label	
06	0602			LIVE TREES AND OTHER PLANTS; BULBS, ROOTS AND THE LIKE; CUT FLOWERS AND ORNAMENTAL FOLIAGE	
				Other live plants (including their roots), cuttings and slips; mushroom spawn	
			060210	Unrooted cuttings and slips	
			060220	Trees, shrubs and bushes, grafted or not, of kinds which bear edible fruit or nuts	
			060230	Rhododendrons and azaleas, grafted or not	
			060240	Roses, grafted or not	
			060290	Other	
			06029010	Mushroom spawn	
			06029090	Plants, live (including their roots), nes	
		12	1209		
				Seeds, fruit and spores, of a kind used for sowing	
	120910			Sugar beet seed	Beet seeds (5-digit "group")
	120919			Other	
	120921			Lucerne (alfalfa) seed	Seeds of forage plants (5-digit "group")
	120922			Clover (<i>Trifolium</i> spp.) seed	
	120923			Fescue seed	
	120924			Kentucky blue grass (<i>Poa pratensis</i> L.) seed	
	120925			Rye grass (<i>Lolium multiflorum</i> Lam., <i>Lolium perenne</i> L.) seed	
	120926			Timothy grass seed	
	120929			Seeds of forage plants, for sowing, nes	
	120930			Seeds of herbaceous plants cultivated principally for their flowers	
	120991			Seeds, vegetable, for sowing, nes	Other seeds (5-digit "group")
	120999		Seeds, fruit and spores for sowing, nes		
	1211				Plants and parts of plants (including seeds and fruits), of a kind used primarily in perfumery, in pharmacy or for insecticidal, fungicidal or similar purposes, fresh or dried, whether or not cut, crushed or powdered
			121110	Liquorice roots	
			121120	Ginseng roots	
			121190	Other	

Source: RAMON - Eurostat's Classifications Server, 2003 (available at: <http://europa.eu.int/comm/eurostat/ramon>).

For comparison with agriculture, there is the same problem as noted earlier, in that seeds that are used for consumption and for planting are not divided along these lines in HS 1996 at the 6-digit level. Some countries may make this distinction at the 8-digit or 10-digit level (see below), but this is optional and different countries may use different coding systems. Thus, it would probably be very difficult and time-consuming to collect and collate all of this information from international trade statistics. The only component of total seed production that is classified at the 6-digit level in HS 1996 is seeds that are not used for consumption (Heading 1209 - Seeds, fruit and spores, of a kind used for sowing).

FAO databases

FAOSTAT contains two databases that may be used to obtain seed statistics. The first is the "Trade flow valid data: all agricultural products". This database comprises import and export statistics expressed in terms of quantity and value and reported by origin and destination countries. All quantities are expressed in terms of metric tonnes (MT) and values in terms of 1000 USD.

These data are generated from the “Trade Flow Source” data (see below) through a conversion process that converts from the original nomenclature of the reporter country to the FAOSTAT data standards. Furthermore, data has to be validated because sometimes the original data contains errors and it has to be reconciled when discrepancies appear between reporter countries and trading partners.

In the absence of reliable sources or when information for the latest year is not available, figures for quantities and values are estimated from the statistics of trading partners. In a few instances, when information is available in terms of quantities only, corresponding values are estimated, using unit values based on data from trading partners.

This database only includes statistics on international trade in “seeds, fruits and spores for planting”, which presumably corresponds to HS 1996 Heading 1209 - Seeds, fruit and spores, of a kind used for sowing. Table 7 presents this information for the year 2002. The table shows total trade of this product category of 740 thousand MT, with a total value of trade of around 2.35 billion USD. Forest tree seeds would be included as part of this, but the amount might be only a small proportion of the total as trade in seeds used for grass and other forage plants is probably quite high.

Table 7 FAOSTAT statistics on exports of “seeds, fruits and spores for planting” in 2002

Country	Quantity (in MT)	Value (in '000 USD)	Unit value (USD/MT)	Country	Quantity (in MT)	Value (in '000 USD)	Unit value (USD/MT)
Albania	99	88	889	Kyrgyzstan	522	837	1,603
Argentina	2,860	4,912	1,717	Latvia	11	1,186	107,818
Armenia	0	0	0	Lithuania	429	825	1,923
Australia	17,734	40,798	2,301	Luxembourg	696	969	1,392
Austria	808	3,949	4,887	Madagascar	1	12	12,000
Azerbaijan, Republic of	1	7	7,000	Malaysia	224	529	2,362
Barbados	0	5	0	Malta	2	118	59,000
Belarus	524	536	1,023	Mauritius	5	11	2,200
Belgium	11,520	51,148	4,440	Mexico	1,284	10,312	8,031
Benin	4	229	57,250	Moldova, Republic of	478	3,250	6,799
Brazil	6,820	24,718	3,624	Mongolia	0	0	0
Cameroon	0	0	0	Morocco	495	2,997	6,055
Canada	52,610	60,788	1,155	Namibia	203	132	650
China, Hong Kong SAR	28	150	5,357	Netherlands	102,090	480,284	4,705
China, Mainland	6,731	29,155	4,331	New Caledonia	0	25	0
China, Taiwan Prov of	957	14,366	15,011	New Zealand	14,600	22,932	1,571
Colombia	2	27	13,500	Nicaragua	27	28	1,037
Costa Rica	237	8,398	35,435	Norway	29	504	17,379
Côte d'Ivoire	0	0	0	Pakistan	1,949	1,541	791
Croatia	184	504	2,739	Panama	4	4	1,000
Cuba	1	595	595,000	Peru	95	4,097	43,126
Cyprus	4	34	8,500	Philippines	615	1,291	2,099
Czech Republic	6,010	9,405	1,565	Poland	1,780	4,582	2,574
Denmark	97,320	145,124	1,491	Portugal	452	2,619	5,794
Ecuador	192	145	755	Qatar	0	0	0
Egypt	15,404	9,455	614	Romania	351	265	755
El Salvador	2	13	6,500	Russian Federation	163	608	3,730
Estonia	198	124	626	Saudi Arabia	54	119	2,204
Ethiopia	18	2	111	Singapore	179	920	5,140
Fiji Islands	2	6	3,000	Slovakia	825	918	1,113
Finland	68	479	7,044	Slovenia	1,007	3,021	3,000
France	43,389	201,264	4,639	South Africa	8,443	13,183	1,561
French Polynesia	10	12	1,200	Spain	7,431	20,485	2,757
Georgia	21	410	19,524	Sri Lanka	13	940	72,308
Germany	40,306	210,527	5,223	Sudan	1	0	0
Greece	378	1,352	3,577	Swaziland	68	27	397
Guatemala	227	8,168	35,982	Sweden	1,600	24,073	15,046
Guyana	0	0	0	Switzerland	217	1,813	8,355
Honduras	21	288	13,714	Tanzania, United Rep of	160	291	1,819
Hungary	5,651	8,184	1,448	Thailand	4,110	19,718	4,798
Iceland	5	85	17,000	Trinidad and Tobago	2	63	31,500
India	10,659	20,762	1,948	Tunisia	271	87	321
Indonesia	802	1,377	1,717	Turkey	8,346	6,755	809
Iran, Islamic Rep of	3,720	2,687	722	Uganda	12	52	4,333
Ireland	354	494	1,395	Ukraine	8,922	14,405	1,615
Israel	15,490	53,075	3,426	United Kingdom	6,995	60,677	8,674
Italy	20,914	88,909	4,251	United States of America	197,316	537,306	2,723
Japan	1,676	82,795	49,400	Uruguay	2,424	1,885	778
Jordan	2	313	156,500	Yemen	4	2	500
Kenya	145	1,212	8,359	Zambia	28	28	1,000
Korea, Republic of	526	17,367	33,017	Zimbabwe	888	2,388	2,689
WORLD TOTAL					740,455	2,353,555	3,179

Source: FAO, 2004 (available at: <http://apps.fao.org/default.htm>).

The second FAOSTAT database containing statistics on international trade in seeds and other plant material is the “Trade flow source data: all agricultural products”. The purpose of this database is to allow users to have access to the raw trade flow statistics that FAO receives each year on tapes and diskettes. This data comes from national correspondents and from the COMTRADE database, which is compiled each year by the United Nations Statistics Division from the data that they receive from national customs authorities. Some of the raw data is altered before it is included in the database (e.g. countries are given numeric codes to comply with the FAOSTAT data standards). However, most of the data is left in its original format. Most importantly, the statistics are not converted to common measurement units (amounts and values), although information about the measurements used in the statistics is also given in the database in some cases.

To examine the viability of using this database to collect information about trade in seeds, data for Canada was extracted and examined. Canada was chosen because a complete listing of Canada’s international trade classification system is available on-line at the STATCAN website (<http://www.statcan.ca/english/tradedata/cec/index.htm>). This database presents all of the HS 1996 codes used by Canada to the 8-digit HS 1996 code level (i.e. Tariff Item).

The process used to extract this data was as follows. First, all of the tariff items containing the word “seed” were extracted from the STATCAN database. This resulted in 102 tariff items containing the word “seed”. Non-agricultural products were removed from this list (e.g. seed planters) and the codes for other plant material (from HS 1996 Chapter 6) were added to the list. This gave a total list of 94 tariff items. Agricultural and horticultural seeds used for planting and/or planting stock are covered by 73 tariff items (although some of these may include more than just seeds). Forest tree seeds are covered by two tariff items and forest plant material is covered by four tariff items (see Table 8). These codes were then used to extract the trade quantities and values (imports and exports) for Canada in the year 2002 from the FAOSTAT database. The data had to be extracted product by product at the HS 1996 6-digit level, which took a considerable amount of time.

Table 8 Tariff items (HS 1996 8-digit codes) covering seeds and other plant material in Canada's international trade statistics

Tariff Item (HS 1996 8-digit code)	Description	Agricultural and/or horticultural seeds and planting stock	Forest and/or tree seeds	Tree planting stock
CHAPTER 6 - LIVE TREES AND OTHER PLANTS; BULBS, ROOTS AND THE LIKE; CUT FLOWERS AND ORNAMENTAL FOLIAGE				
06021000	Cuttings and slips, unrooted	part		part
06022000	Trees, edible fruit or nut, shrubs and bushes, grafted or not	part		part
06023000	Rhododendrons and azaleas, grafted or not	yes		
06024000	Roses, grafted or not	yes		
06029010	Mushroom spawn	yes		
06029090	Plants, live (including their roots), nes	part		part
CHAPTER 7 - EDIBLE VEGETABLES AND CERTAIN ROOTS AND TUBERS				
07011000	Potatoes seed, fresh or chilled	yes		
07131010	Pea seeds, dried, shelled, of a kind used for sowing	yes		
07132010	Chickpea seeds, dried, shelled, of a kind used for sowing	yes		
07133110	Beans, Vigna mungo Hepper/Vigna rad Wilczek, seeds of a kind for sowing	yes		
07133210	Beans, small red (Adzuki), dried, shell, seeds of a kind for sowing	yes		
07133311	Navy/white pea bean seeds of a kind for sowing, dried, shelled	yes		
07133319	Kidney bean seeds of a kind for sowing, dried, shelled, nes	yes		
07133910	Bean seeds of a kind for sowing, nes, dried, shelled	yes		
07134010	Lentil seeds of a kind used for sowing, dried, shelled	yes		
07134099	Lentils, o/t seeds f sowing, dried, shelled, whether or not skinned or split, nes			
07135010	Broad bean & horse bean seeds of a kind for sowing, dried, shelled	yes		
07135090	Br. beans & horse beans, o/t seed, dried, shelled, whether/not skinned or split			
07139010	Leguminous vegetable seeds of a kind f sowing, dried, shelled, nes	yes		
07139090	Leg. vegetables, o/t seeds f sowing, dried, shell, whether/not skin/split, nes			
CHAPTER 9 - COFFEE, TEA, MATÉ AND SPICES				
09091000	Anise or badian seeds	part		
09092000	Coriander seeds	part		
09093000	Cumin seeds	part		
09094000	Caraway seeds	part		
09095000	Fennel seeds; juniper berries	part		
CHAPTER 10 - CEREALS				
10011010	Durum wheat, seed	yes		
10011090	Durum wheat, except seed			
10019010	Wheat nes, seed	yes		
10019021	Red spring wheat, exc seed, grade 1			
10019022	Red spring wheat, exc seed, grade 2			
10019023	Red spring wheat, exc seed, grade 3			
10019029	Red spring wheat, exc seed, nes			
10019030	White winter wheat, except seed			
10019040	Canadian western red winter wheat, exc seed			
10019050	Soft white spring wheat, exc seed			
10020010	Rye seed	yes		
10020090	Rye, except seed			
10030010	Barley seed	yes		
10030090	Barley, except seed			
10040010	Oats, seed	yes		
10051010	Yellow dent corn seed	yes		
10051090	Maize (corn) seed, o/t yellow dent, nes	yes		
10083000	Canary seed			
CHAPTER 12 - OIL SEED AND OLEAGINOUS FRUIT; MISC GRAIN, SEED AND FRUIT; INDUSTRIAL OR MEDICINAL PLTS; STRAW AND FODDER				
12051010	Low erucic acid rape or colza seeds for sowing, w/n broken	yes		
12051020	Rape/colza seeds, low erucic acid, for oil extraction, w/n broken			
12051090	Rape or colza seeds, low erucic acid, whether or not broken, nes			
12059010	Rape or colza seeds, o/t low erucic acid, for sowing, w/n broken	yes		
12059020	Rape/colza seeds, o/t low erucic acid, for oil extraction, w/n broken			
12059090	Rape or colza seeds, o/t low erucic acid, whether or not broken, nes			
12060010	Sunflower seeds, for sowing	yes		
12060020	Sunflower seeds, for oil extraction, whether or not broken			
12060090	Sunflower seeds, nes, whether or not broken			
12072000	Cotton seeds, whether or not broken	part		
12073000	Castor oil seeds, whether or not broken	part		
12074000	Sesamum seeds, whether or not broken	part		
12075000	Mustard seeds, whether or not broken	part		
12076000	Safflower seeds, whether or not broken	part		
12079100	Poppy seeds, whether or not broken	part		
12079900	Oil seeds and oleaginous fruits, nes, whether or not broken	part		
12089000	Flours and meals of oil seeds or oleaginous fruits, except mustard, nes			

Tariff Item (HS 1996 8-digit code)	Description	Agricultural and/or horticultural seeds and planting stock	Forest and/or tree seeds	Tree planting stock
12091000	Seeds, sugar beet, for sowing	yes		
12092110	Seeds, lucerne (alfalfa), for sowing, certified	yes		
12092190	Seeds, lucerne (alfalfa), for sowing, o/t certified	yes		
12092211	Seeds, Red clover, double cut, for sowing	yes		
12092219	Seeds, Red clover, nes, for sowing	yes		
12092220	Seeds, Sweet clover, for sowing	yes		
12092230	Seeds, Alsike clover, for sowing	yes		
12092240	Seeds, white clover, for sowing	yes		
12092290	Seeds, clover nes, for sowing	yes		
12092311	Seeds, creeping red fescue, for sowing, certified	yes		
12092319	Seeds, creeping red fescue, for sowing, o/t certified	yes		
12092320	Seeds, tall fescue, for sowing	yes		
12092330	Seeds, meadow fescue, for sowing	yes		
12092390	Seeds, fescue nes, for sowing	yes		
12092400	Seeds, Kentucky blue grass, for sowing	yes		
12092510	Seeds, rye grass, annual, for sowing	yes		
12092520	Seeds, rye grass, perennial, for sowing	yes		
12092610	Seeds, Timothy grass, for sowing, certified	yes		
12092690	Seeds, Timothy grass, for sowing, other than certified	yes		
12092911	Seeds, Brome grass, meadow, for sowing	yes		
12092912	Seeds, Brome grass, smooth, for sowing	yes		
12092919	Seeds, Brome grass, nes, for sowing	yes		
12092921	Seeds, Wheatgrass, crested, for sowing	yes		
12092929	Seeds, Wheatgrass, nes, for sowing	yes		
12092930	Seeds, bent grass , for sowing	yes		
12092940	Seeds, Bird's-foot trefoil, for sowing	yes		
12092950	Seeds, Orchard grass, for sowing	yes		
12092991	Seeds, Wild rye, for sowing	yes		
12092999	Seeds of forage plants, for sowing, nes	yes		
12093000	Seeds, flower, for sowing	yes		
12099100	Seeds, vegetable, nes for sowing	yes		
12099900	Seeds, fruit and spores for sowing, nes	part	part	
12119000	Plants &pts of plants(incl seed & fruit) used in pharm, perf, insect etc, nes	part	part	part
12121000	Locust beans, including seeds, fresh, chilled, frozen or dried, w/n ground	part		
TOTAL NUMBER OF TARIFF ITEMS REFERRING TO SEED AND/OR PLANT MATERIAL		73	2	4

Source: STATCAN (available at: <http://www.statcan.ca/english/tradedata/cec/index.htm>).

The results obtained from this exercise are given in Table 9. The main problem with this particular dataset is that it does not give the measurement units used in the case of Canada. It is likely that the value data would be recorded in national currency (CND), but this could be in single units, thousands or millions. Quantity data is likely to be recorded in metric measurement units, but the same problem of scale applies. Examination of the unit price data showed that the same units may not be used for import and export statistics in some cases (e.g. see the figures shown in bold in Table 9) and comparisons between similar products suggest that different units may be used for different products.

Table 9 FAOSTAT statistics on Canada's international trade in seeds and other plant material in 2002 (raw data)

Tariff Item	Description	Quantity		Value		Unit price		
		imports	exports	imports	exports	imports	exports	both
07011000	Potatoes seed, fresh or chilled	1,001,600	13,422,500	3,409,035	50,179,612	3.40	3.74	3.72
07131010	Pea seeds, dried, shelled, of a kind used for sowing	356,300	1,445,415,984	2,465	6,896,515	0.01	0.00	0.00
07132010	Chickpea seeds, dried, shelled, used for sowing	0	195,211,500	0	1,335,948	n.a.	0.01	0.01
07133110	Beans, Vigna mungo Hepper/Vigna rad Wilczek sowing	132,289,789	149,515,304	1,282,067	1,496,386	0.01	0.01	0.01
07133210	Beans, small red (Adzuki), dried, shell, for sowing	0	329,131,708	0	3,631,299	n.a.	0.01	0.01
07133311	Navy/white pea bean seeds for sowing, dried, shelled	616,088,203	1,486,880,724	9,681,853	11,491,257	0.02	0.01	0.01
07133319	Kidney bean seeds for sowing, dried, shelled, nes		471,255,912		4,704,651	n.a.	0.01	0.01
07133910	Bean seeds of a kind for sowing, nes, dried, shelled	133,373,707	5,943,374,800	1,838,334	49,023,421	0.01	0.01	0.01
07134010	Lentil seeds of a kind used for sowing, dried, shelled	0	347,038,696	0	2,416,206	n.a.	0.01	0.01
07135010	Broad bean & horse bean seeds for sowing	16,131,709	99,178,600	163,081	615,751	0.01	0.01	0.01
07139010	Leguminous vegetable seeds for sowing, nes	265,236,608	149,921,600	3,015,299	1,048,208	0.01	0.01	0.01
09091000	Anise or badian seeds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
09092000	Coriander seeds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
09093000	Cumin seeds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
09094000	Caraway seeds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
09095000	Fennel seeds; juniper berries	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
10011010	Durum wheat, seed	5,863,853	364,546,696	9,657,513	1,024,695,308	1.65	2.81	2.79
10019010	Wheat nes, seed	11,472,265	855,710,600	18,783,658	2,056,016,080	1.64	2.40	2.39
10020010	Rye seed	0	2,855,800	0	6,858,699	n.a.	2.40	2.40
10030010	Barley seed	0	3,303,800	0	8,735,038	n.a.	2.64	2.64
10040010	Oats, seed	0	512,904,804	0	1,362,026	n.a.	0.00	0.00
10051010	Yellow dent corn seed		172,866,192		3,449,028		0.02	
10051090	Maize (corn) seed, o/t yellow dent, nes	3,871,646	464,519,216	72,014,334	16,290,744	18.60	0.04	0.14
12051010	Low erucic acid rape/colza seeds for sowing, broken	0	662,447,392	0	16,845,935	n.a.	0.03	0.03
12059010	Rape/colza seeds, o/t low erucic acid, sowing, broken	0	28,948,000	0	582,381	n.a.	0.02	0.02
12060010	Sunflower seeds, for sowing	0	22,975,500	0	97,312	n.a.	0.00	0.00
1207xxxx	Various other seeds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
12091000	Seeds, sugar beet, for sowing	5,063,716	680,400	3,388,278	7,500	0.67	0.01	0.59
12092110	Seeds, lucerne (alfalfa), for sowing, certified		476,944,196		12,012,073		0.03	
12092190	Seeds, lucerne (alfalfa), for sowing, o/t certified	134,316,748	759,554,480	3,827,244	17,518,221	0.03	0.02	0.02
12092211	Seeds, Red clover, double cut, for sowing		140,395,500		2,047,640		0.01	
12092219	Seeds, Red clover, nes, for sowing		164,473,408		2,526,289		0.02	
12092220	Seeds, Sweet clover, for sowing	113,866,265	56,280,700	2,699,187	869,825	0.02	0.02	0.02
12092230	Seeds, Alsike clover, for sowing		59,065,900		956,212		0.02	
12092240	Seeds, white clover, for sowing		12,237,700		411,607		0.03	
12092290	Seeds, clover nes, for sowing		15,657,700		235,210		0.02	
12092311	Seeds, creeping red fescue, for sowing, certified		654,849,304		10,297,307		0.02	
12092319	Seeds, creeping red fescue, for sowing, o/t certified		1,053,968,172		14,582,071		0.01	
12092320	Seeds, tall fescue, for sowing	159,775,527	156,127,892	2,837,205	2,633,342	0.02	0.02	0.02
12092330	Seeds, meadow fescue, for sowing		26,831,500		324,754		0.01	
12092390	Seeds, fescue nes, for sowing		52,186,400		890,432		0.02	
12092400	Seeds, Kentucky blue grass, for sowing	315,816,897	37,831,600	8,610,929	1,779,041	0.03	0.05	0.03
12092510	Seeds, rye grass, annual, for sowing		183,940,496		1,361,199		0.01	
12092520	Seeds, rye grass, perennial, for sowing	411,378,462	243,848,108	5,425,670	3,414,799	0.01	0.01	0.01
12092610	Seeds, Timothy grass, for sowing, certified		463,276,200		4,989,717		0.01	
12092690	Seeds, Timothy grass, for sowing, other than certified	18,775,210	307,999,704	418,487	3,825,215	0.02	0.01	0.01
12092911	Seeds, Brome grass, meadow, for sowing		13,352,000		440,320		0.03	
12092912	Seeds, Brome grass, smooth, for sowing		17,288,400		367,211		0.02	
12092919	Seeds, Brome grass, nes, for sowing		1,011,600		103,640		0.10	
12092921	Seeds, Wheatgrass, crested, for sowing		39,347,900		1,149,208		0.03	
12092929	Seeds, Wheatgrass, nes, for sowing		125,198,696		3,992,501		0.03	
12092930	Seeds, bent grass, for sowing		750,700		149,184		0.20	
12092940	Seeds, Bird's-foot trefoil, for sowing		47,134,400		1,240,023		0.03	
12092950	Seeds, Orchard grass, for sowing		464,800		11,303		0.02	
12092991	Seeds, Wild rye, for sowing		7,593,300		453,370		0.06	
12092999	Seeds of forage plants, for sowing, nes		98,107,400		3,693,512		0.04	
12093000	Seeds, flower, for sowing	1,951,889	1,814,900	25,077,330	691,192	12.85	0.38	6.84
12099100	Seeds, vegetable, nes for sowing	239,357,335	26,685,600	42,988,652	1,579,194	0.18	0.06	0.17
12099900	Seeds, fruit and spores for sowing, nes	134,143,529	16,075,000	5,605,426	820,723	0.04	0.05	0.04
12121000	Locust beans, including seeds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
TOTAL		3,035,717,098	18,982,399,384	230,479,632	3,363,145,640	0.08	0.18	0.16

Source: FAO, 2004 (available at: <http://apps.fao.org/default.htm>).

It is possible to compare the raw data and validated data for HS 1996 Heading 1209 - Seeds, fruit and spores, of a kind used for sowing, because this product category appears in both databases (see Table 10). The total quantities in the two datasets are very different and are not proportional to one another, suggesting that the raw data contains a number of different measurement units and figures at different scales. The figures for total value from the two datasets are also different, but are proportionately similar to each other. This could be because the raw value data has been converted from CND to USD in the validated database, but then the former should be larger than the latter. Thus, it remains difficult to interpret the value statistics presented in the raw data.

The last line in Table 10 shows an estimate of the total quantity and value of trade in forest seeds with Canada in 2002. This estimate was produced by dividing the quantities and values under code 12099900 by the total quantities under 1209 in the raw data and applying this fraction to the validated data. Such an approximation would only work if the same measurement units have been used for all of the raw data under HS 1996 Heading 1209. As it is not known if this is the case, this estimate should be treated with a great deal of caution.

Table 10 Comparison of the raw and validated statistics on Canada’s international trade in “seeds, fruits and spores for planting” in 2002 (from FAOSTAT)

HS 1996 code	Description	Quantity		Value		Unit price		
		imports	exports	imports	exports	imports	exports	both
1209	Seeds, fr & spores, used for sowing (raw data)	1,850,031,418	5,260,974,056	110,631,993	95,373,835	0.06	0.02	0.03
1209	Seeds, fr & spores, used for sowing (FAO validated)	36,996	105,220	141,022,000	121,576,000	3,812	1,155	1,846
12099900	Seeds, fr & spores for sowing, nes (FAO estimate)	2,683	322	7,145,206	1,046,201	2,664	3,254	2,727

Source: FAO, 2004 (available at: <http://apps.fao.org/default.htm>). Note: measurement units for the raw data are undefined; for the other data, quantities are in MT, values are in USD and unit prices are in USD per MT.

Other sources of data

An internet search was also employed to see if statistics on the production and trade of forest seeds and other plant material could be obtained from other sources. This did not yield many results, but what was obtained is presented in Tables 11 to 16 below.

Tables 11 and 12 present some statistics on seed imports and exports in the Republic of Korea. These were obtained from the US Department of Agriculture, Foreign Agricultural Service (FAS, see: <http://www.fas.usda.gov> for further details). These two tables show the total quantity and value of forest tree seed imports and exports for the year 2001-2002. They also show trade in other types of seeds for comparison. The complete report contains information about the production of most types of seeds in the Republic of Korea except, unfortunately, forest seeds.

Tables 13 and 14 present statistics on the value of forest tree seed imports and exports for the United States of America. These were also obtained from the FAS website. This data is available for a number of years and is disaggregated by trading partner countries. It is also possible to query the database at the 10-digit level, so it would be possible to obtain statistics on trade of other types of seeds, but this would require a lot of knowledge about the details of the coding system used in the United States of America and could take a lot of time.

Table 11 Republic of Korea planting seed imports 2001-2002 (July-June)

Commodity	From World		From USA	
	Volume (in kg)	Value (in '000 USD)	Volume (in kg)	Value (in '000 USD)
Corn	266,153	1,769	266,153	1,769
Rye	6,117,330	2,931	3,396,130	1,630
Oats	449,060	185	0	0
Lucerne seeds	13,013	30	9,386	21
Clover seeds	7,750	28	7,250	26
Fescue seeds	876,457	1,352	836,268	1,302
Kentucky blue grass	173,664	557	173,664	557
Rye grass	565,199	579	431,195	528
Timothy grass	4,083	7	2,023	3
Sudan grass	537,276	702	306,709	421
Orchard grass	113,416	226	85,116	166
Other grass	1,478,890	2,785	194,185	419
Herbaceous plants	30,012	2,285	3,657	499
Vegetable seeds	1,896,813	25,521	181,505	1,353
Seeds of other forest tree	112,410	419	1,011	24
Seed of fruit tree	125,099	256	137	24
Lawn seed	588,246	1,045	519,246	890
Other	213,680	1,148	49,433	221
TOTAL	13,568,551	41,825	6,463,068	9,853

Source: Korean Customs Service, in: Republic of Korea planting seeds annual 2002, USDA FAS GAIN Report #KS2054.

Table 12 Republic of Korea planting seed exports 2001-2002 (July-June)

Commodity	To World		To USA	
	Volume (in kg)	Value (in '000 USD)	Volume (in kg)	Value (in '000 USD)
Herbaceous Plants	785	9	0	0
Vegetable Seed	476,228	17,430	9,254	1,081
Seeds of other forest tree	12,316	140	130	12
Lawn Seed	60	1	60	1
Other	68,266	547	250	1
TOTAL	557,655	18,127	9,694	1,095

Source: Korean Customs Service, in: Republic of Korea planting seeds annual 2002, USDA FAS GAIN Report #KS2054.

Table 13 United States of America value of exports of tree and shrub seeds (HS 1996 10-digit code 1209992000) by country 1997-2001

Country	Calendar year (values in '000 USD)				
	1997	1998	1999	2000	2001
Brazil	0	0	0	6	0
Canada	0	0	3	0	0
Ecuador	40	142	74	0	0
Germany(*)	11	0	0	0	0
Israel(*)	0	0	0	20	0
Mexico	0	0	0	0	0
Netherlands	103	0	10	40	0
Saudi Arabia	0	0	0	47	0
Spain	0	0	0	183	0
United Arab Emirates	0	0	877	0	0
TOTAL	154	142	964	296	0

Source: Department of Commerce, U.S. Census Bureau, Foreign Trade Statistics. Note: (*) denotes a country that is a summarisation of its component countries.

Table 14 United States of America value of imports of tree and shrub seeds (HS 1996 10-digit code 1209992000) by country 1997-2001

Country	Calendar year (values in '000 USD)				
	1997	1998	1999	2000	2001
Azerbaijan, Republic of	5	5	8	3	3
Argentina	0	0	0	0	2
Australia(*)	74	89	86	65	171
Austria	0	0	0	0	0
Belgium-Luxembourg(*)	0	0	0	0	0
Bolivia	9	57	49	16	0
Brazil	4	70	22	21	40
Bulgaria	0	0	3	0	2
Canada	80	96	41	170	11
China, Peoples Republic of	206	164	104	130	124
Costa Rica	3,562	323	351	17	115
Denmark(*)	13	13	26	167	52
El Salvador	9	0	14	4	0
Czech Republic	0	2	0	0	0
France(*)	17	23	26	30	27
Georgia, Republic of	0	3	3	18	10
Germany(*)	103	127	89	127	42
Guatemala	0	3	0	0	0
Hong Kong	0	0	0	0	0
Honduras	0	0	0	0	0
Hungary	9	14	6	22	2
India	8	14	10	9	6
Israel(*)	0	0	0	3	8
Italy(*)	35	7	32	27	19
Japan	49	79	56	106	53
Jamaica	46	62	52	46	19
Korea, Republic of	30	9	0	30	18
Madagascar	0	2	0	4	16
Macedonia (Skopje)	2	7	3	3	0
Mexico	81	91	205	485	306
Netherlands Antilles(*)	0	0	0	0	0
Netherlands	194	47	40	25	84
Nepal	2	0	0	0	0
New Zealand(*)	16	8	8	13	13
Russian Federation	12	1	0	10	10
Seychelles	0	0	30	0	0
South Africa, Republic of	43	27	59	7	25
Slovenia	10	21	11	18	13
Spain	23	9	5	0	5
Switzerland(*)	7	0	0	0	0
Thailand	0	0	0	7	4
Turkey	2	5	0	3	3
Taiwan	147	111	70	89	53
United Kingdom	19	28	5	0	2
Ukraine	17	30	45	9	64
Uruguay	0	0	0	0	4
TOTAL	4,833	1,545	1,457	1,683	1,327

Source: Department of Commerce, U.S. Census Bureau, Foreign Trade Statistics. Note: (*) denotes a country that is a summarisation of its component countries.

Table 15 Estimates of the commercial markets for seeds and planting material

Location	Internal commercial market (million USD)	Location	Internal commercial market (million USD)
USA	5,700	Greece	140
China	3,000	Egypt	140
Japan	2,500	Belgium	130
CIS	2,000	Chile	120
France	1,370	Nigeria	120
Brazil	1,200	Kenya	100
Germany	1,000	New Zealand	90
Argentina	930	Slovakia	90
Italy	650	Switzerland	80
India	600	Finland	80
United Kingdom	570	Paraguay	70
Canada	550	Ireland	60
Poland	400	Portugal	60
Mexico	350	Bangladesh	60
Spain	300	Colombia	40
Netherlands	300	Bolivia	35
Australia	280	Peru	30
Hungary	200	Zimbabwe	30
Denmark	200	Slovenia	30
Sweden	200	Saudi Arabia	18
Austria	170	Zambia	15
Turkey	170	Ecuador	12
Morocco	160	Malawi	10
South Africa	150	Dominican Rep.	7
Czech Republic	150	TOTAL	24,387

Source: International Seed Federation (www.worldseed.org). Note: the total represents the sum of the commercial seed markets of the listed countries. The total commercial world seed market is assessed at approximately USD 30 billion.

Table 16 Estimated values of seed exports from some countries

Country	Agricultural Seeds (in million USD)	Horticultural Seeds (in million USD)	Total (in million USD)
USA	550	249	799
Netherlands	420	200	620
France	373	125	498
Denmark	150	40	190
Germany	150	35	185
Chile	84	60	144
Canada	104	18	122
Belgium	111	n.a.	n.a.
Italy	70	41	111
Japan	5	100	105
Brazil	n.a.	n.a.	80
Argentina	68	1	69
Hungary	n.a.	n.a.	65
Australia	30	13	43
Austria	40	n.a.	n.a.
New-Zealand	28	8	36
Sweden	n.a.	n.a.	35
Spain	23	10	33
China	8	22	30
Thailand	6	18	24
Turkey	n.a.	n.a.	22

Mexico	n.a.	20	n.a.
India	4	16	20
Czech Rep.	18	0	18
South Africa	10	7	17
Korea	n.a.	n.a.	16
Israel	1	14	15
Russian Fed.	11	2	13
Taiwan	n.a.	8	8
Guatemala	0	8	8
Kenya	n.a.	n.a.	5
Pakistan	1	4	5
Uruguay	4.5	0	4.5
Bolivia	3	0	3
Colombia	3	0	3
Costa Rica	0	3	3
Ethiopia	2	0	2
Peru	0	1.5	1.5
Finland	1	0	1
TOTAL	2,278.5	1,023.5	3,354

Source: International Seed Federation (www.worldseed.org). Note: these figures reflect seed movements only and do not take licenses into consideration.

Tables 15 and 16 reproduce statistics published by the International Seed Federation (ISF) at: www.worldseed.org. These show a total commercial world seed market of about USD 30 billion. Their website does not specify how this is defined or where these statistics have come from but, presumably, they have been collected from ISF members. Because this is only the “commercial” market, these figures are likely to be a large underestimate of the total value of World seed production. For example, dividing their value figure by the total amount of production recorded in FAOSTAT (which is itself probably an underestimate) produces a unit value of production of only USD 150 per MT, which is very low compared with the unit values shown in the trade statistics presented in Table 7. Similarly, their figure for the value of total seed exports from the Republic of Korea is less than the figure given for planting seeds alone in Table 12.

Summary and conclusions

Table 17 below presents a summary of the information that is readily available from national and international statistics about the production and trade in agricultural and forest seeds and other plant material.

Table 17 Summary of information available about the production and trade of agricultural seeds and forest seeds and other plant material and

Type of seed and plant material	Production			International trade		
	Classification	Quantity	Value	Classification	Quantity	Value
Forest seeds	Not separately classified in any of the main classification systems.	n.a.	n.a.	HS 1996 Sub-heading 120999.	may be available	may be available
Other forest plant material	Not separately classified in any of the main classification systems.	n.a.	n.a.	Included as part of a number of HS 1996 sub-headings. May be defined by countries as a collection of HS-codes at a higher digit-level.	n.a.	n.a.
Agricultural seeds of a type that is consumed and planted	In all classification systems, this is included in total production (i.e. consumed and planted). However, FAO collects this data using an annual questionnaire.	Available in FAOSTAT	n.a.	This is included in total production at the 6-digit level in HS 1996 (sub-headings). May be defined by countries as a collection of HS-codes at a higher digit-level.	n.a.	n.a.
Agricultural seeds used for planting only	Classified under several codes in CPC 1.1 only. Not separately classified in any of the other main classification systems. Not defined, recorded or classified in FAOSTAT.	n.a.	n.a.	HS 1996 Heading 1209 (excluding Sub-heading 120999).	The total for HS 1996 Heading 1209 is available in FAOSTAT	The total for HS 1996 Heading 1209 is available in FAOSTAT

For production statistics, the table shows that forest seeds and other plant material are not sufficiently well defined in most classification systems to allow such statistics to be easily obtained. In the rest of the agricultural sector, the main classification problem is the lack of separation between seed production and production for consumption in the case of seeds that are consumed (e.g. grains, pulses, etc.). However, statistics on the production of most types of agricultural seeds are readily available in FAOSTAT (although the coverage of this database may be only partial and it includes a lot of estimates). Ironically, the one component of agricultural seed production that does not appear in FAOSTAT is seeds that are only used for planting.

A further point worth noting is that production statistics are nearly always measured in units of weight (e.g. kg or MT). In the case of seeds, there are huge differences between different types of seeds in terms of their individual size and weight. Thus, even if production statistics were available, they would have to be treated very carefully in any analysis.

Statistics on the total value of seed production are not readily available anywhere. National income accounts do contain statistics on the value of output by different sectors of the economy, but these are always organised according to one of the systems used to classify economic activities. These classification systems are not very detailed and none of them identifies seed production separately. Indeed, in many cases, the value of output from the whole of the forestry sector is the only figure available (if at all).

The value of seed output could be estimated by multiplying quantities of production and unit values from trade statistics, but this would have to be done very carefully due to differences in size and weight (see above). In addition, there is also the problem that trade prices are often not representative of domestic market prices due to differences in product quality.

For trade statistics, the situation is somewhat better. Most international trade statistics are compiled according to one of a few internationally agreed classification systems. These classification systems are very detailed and individual items within them are very carefully defined. Information about the quantity and value of seed production could be obtained from these statistics, but this would require examination of the statistics in great detail.

Forest tree seeds are a major component of one of the sub-headings in HS 1996 (HS 1996 Code 120999). Statistics compiled at this level of HS 1996 (the 6-digit level) are internationally comparable, so it might be possible to obtain quantity and value statistics quite easily from the COMTRADE database compiled by the United Nations Statistical Office. However, it may take a lot of time to “clean” the data to convert these statistics into common measurement units.

This sub-heading also contains a few other types of seed. It would be necessary to obtain more details about the coding systems used in every country (i.e. the definitions used for higher digit levels) to separate the forest tree seeds from these other types of seed. At this more detailed level, the coding systems used by different countries may vary, so this would take a lot of time and effort. It is likely that these other types of seed will only account for a small proportion of the total, so it would probably not be worthwhile trying to do this.

Other types of forest plant material occurs under a number of HS 1996 sub-headings. It only occurs under a few sub-heading but, in each case, forest plant material would account for only a (probably small) proportion of the total under the sub-heading. Thus, calculating the total for the sub-headings would be relatively easy, but probably give an estimate of the quantity and value of trade that would be far too high.

For comparison with the rest of the agricultural sector, it would be extremely difficult to calculate total seed trade quantities and values. Again, the main problem is the inclusion of seed production in total production for seeds that are consumed. To calculate total seed trade, it would be necessary to obtain detailed HS 1996 codes for every country, identify which items should be included in the total, “clean” the data and add all of the figures together. An attempt to do this for Canada demonstrated that this would be very time consuming. For countries that do not keep trade statistics at more detailed levels of HS 1996 (which could be many), it would not be possible to do this at all.

In conclusion, despite the lack of statistics in this area, it seems likely that the size of the market for forest seeds is relatively small in comparison to agriculture and could amount to about one percent (or less) of the total. In order to obtain statistics about the production and trade of forest seeds and other plant material, it seems likely that a special survey would be required. If desired, this should not be too difficult, as this is one area where governments have maintained a strong interest in the forestry sector through regulation, licensing and inspections. Such a survey should make use of the existing definitions used in the 1996 HS international trade classification system and special attention should be given to recording quantities by amount and/or weight of seeds.