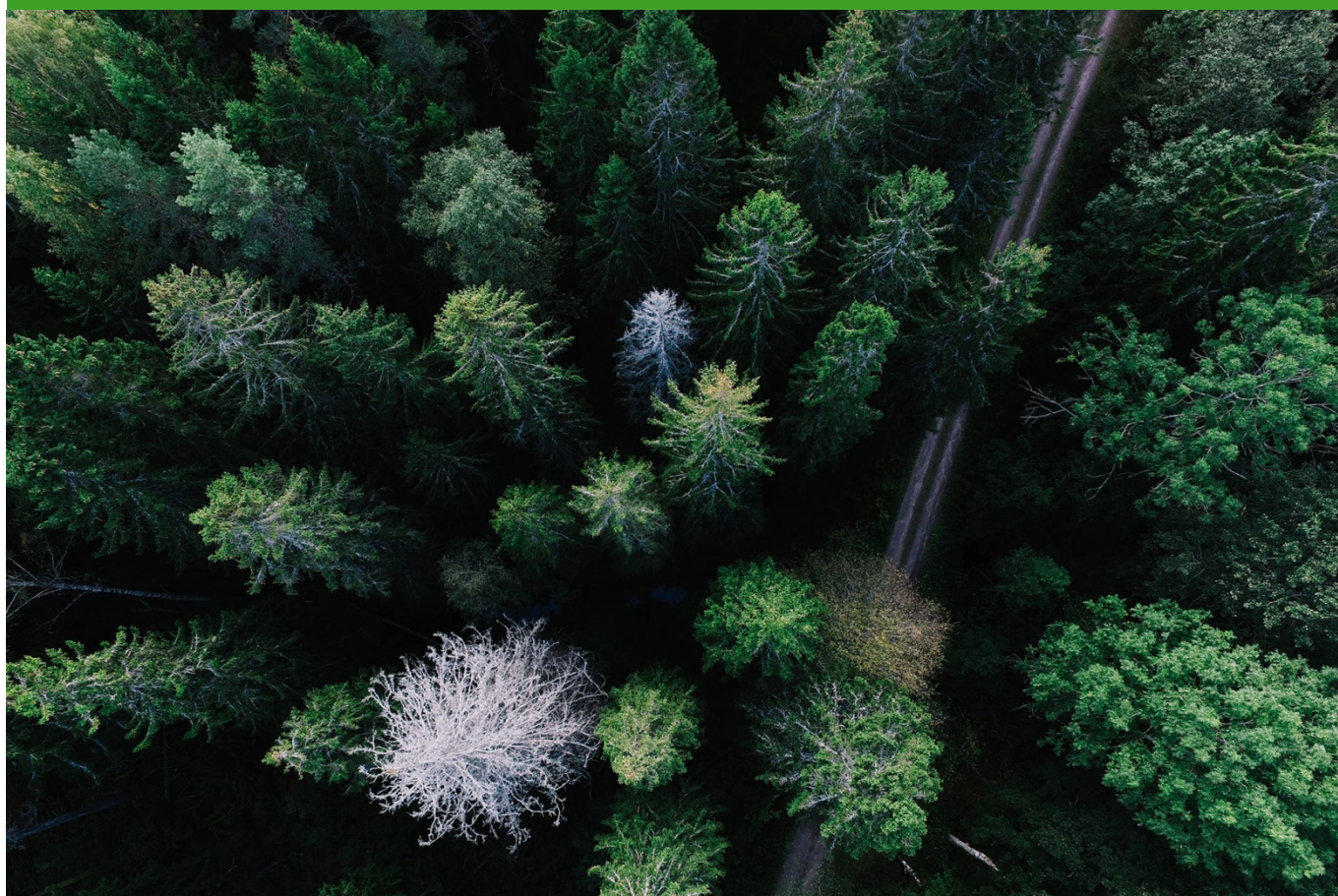


# Trade and production of plants and plant products in Sweden

A knowledge base for pest risk analysis

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## Summary

This survey quantifies the amounts of different plants and plant products traded into Sweden which may serve as pathways of entry for potential plant pests. Furthermore, data on the economic value of plants and plant products are reported, both in terms of production values as well as the value of trade from Sweden.

In total, the volume of traded plants and plant material into Sweden was on average slightly more than 12 million tons per year. Of this, by far the largest part was different types of wood products, 10 million tons, followed by fruit and other types of plant based food, 1.5 million tons. Propagation material for different production systems was in terms of weight a small proportion of the total volume of traded plant goods into Sweden, reaching only about 52 000 tons, it is however a rather large source of living plant material traded. For example, an annual average of 39 million seedlings of forest trees were traded to Sweden each year

The amount of plants and plant material traded from Sweden totaled more than 9 million tons, with an annual yearly value of approximately 30 billion SEK. Hence, the trade from the country was less than into the country. The trade, both into and from Sweden was dominated by wood products, with a yearly average of 10 and 7.5 million tons respectively.

The total annual economic value of plants and plant products produced in Sweden was more than 50 billion SEK, which was 1.6 times the value of the trade of plants and plant products from Sweden. A great majority of the production value is associated with forest trees, 27 billion SEK, and arable plants, 20 billion SEK.

The economic value of vegetables and ornamentals and other plants produced in horticulture was approximately 2 billion SEK each. The estimated annual value of park- and street trees in Swedish cities, based on the cost of replacing them after 80 years, was 1.3 billion SEK. Fruits and berries constitute a minor part of plants and plant products produced, 777 million SEK.

In conclusion the amounts of trade as well as the economic value of plants and plant products quantified in this survey provides valuable information for determining pest specific risks for introduction as well as the potential impact if a species becomes established. The compilation of data also provides support for identifying potential pathways for plant pests.

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# 1 Introduction

Invasive pests are seen as a major threat to plant production, biodiversity and other ecosystem services worldwide. Recent outbreaks of the Dutch Elm disease and Ash dieback have clearly demonstrated which consequences invasive pests can have in the Scandinavian countries. Increasing trade of plant materials and an increased incidence of invasive pests in Europe indicate an increased risk of associated negative impact on plant and plant production in the Scandinavian countries.

Pest risk analysis (PRA) is an important tool used to analyse the risk a plant pest constitutes to a country or territory and form an essential foundation for proper management decisions. A central part of conducting a pest risk assessment is to identify and assess the potential pathways for introduction and to analyse the potential economic consequences associated with the introduced plant pest. In order to do so, information is required on volumes of traded goods and an estimation of the economic values at risk.

Here we present a comprehensive report of i) the volumes of trade of plants and plant products that may provide pathways of introduction for invasive plant pests to Sweden and ii) the economic value of plant production and trade at risk in Sweden. The report contains firstly the volume of propagation material traded into and out from Sweden, such as seeds, seedlings and plants for forestry, agriculture, horticulture, including ornamental and landscaping plants. Secondly, trade into and out from Sweden of other plant materials are covered such as wood, wood products, food and fodder plants traded in a form that potentially can contain living pest specimens. Hence, impregnated wood products and processed fruits are not covered in the report.

The report also presents statistics on the production of plants and plant products within Sweden. This is first and foremost the yearly production of timber and wood products as well as harvested crops from agricultural and horticultural cropping systems, such as cereals and vegetables. To a lesser extent the production of ornamental and landscaping plants is also covered. Based on the area and volume of plants and plant products produced in Sweden together with the sales values, the economic value of the production is reported, a figure that is associated with the economic value at risk from the consequences of damage by invasive pests. Occurrence of a regulated pest in Sweden may potentially limit our possibilities to trade its host plant and products made of it, hence statistics on plant and plant material that are traded from Sweden are also provided in the report.

For many sectors the official statistics are rather well developed and comprehensive in Sweden. Many of the figures presented in the report were gathered directly from different databases and official sources freely available online e.g. Statistics Sweden, Swedish Board of Agriculture and the Swedish Forest Agency which are considered to be reliable sources. For some categories, such as value of forest seedling production, detailed data were missing. In such cases figures have been estimated based on for example the figures on the current production multiplied by seedling price. These figures are thus associated with a higher degree of uncertainty.

## 2 Method

### 2.1 Included materials

This survey covers plants and plant materials produced in Sweden, as well as those traded here. More specifically it includes all plants and plant material that potentially could carry pest organisms, such as insects, mites, bacteria, viruses or fungi. Hence, all plant materials that are not processed in such a way that living organisms are unlikely to remain in the material. Materials such as impregnated wood products are thus excluded while wood products that are not treated or impregnated are included.

The survey includes wood and forestry products, living plants as well as all sorts of seeds, seedlings, cuttings and other types of propagation materials. Furthermore, most plant based food items that are not dried, boiled or processed in other ways, are included in the survey. However, there are some exceptions for certain exotic fruits when the dried and the fresh fruit were grouped together, these were then still included.

### 2.2 Trade to Sweden

Most trade statistics were obtained from Statistics Sweden and based on custom reports on foreign trade (Statistics Sweden, 2017a). The custom reports are reported with Combined Nomenclature (CN) which is used by all EU countries in their foreign trade statistics and also in the EU's Common Customs Tariff. These statistics are rather reliable and detailed, however trade of small volumes of goods are not reported, especially not within the EU. Therefore, figures on traded volumes provide conservative estimates of the actual volumes. Figures are reported as mean values, as well as max and min values, for the period 2012-2016 if nothing else is stated. The proportion of the trade from countries within EU is given as % trade within EU in each table.

Statistics on trade to Sweden for forestry propagation material were obtained from the Swedish Forest Agency (2017a). Due to lags in the reporting system, data were only available until the year 2015. Data on total amounts of traded propagation material for forestry purposes, although not specified per tree species, were available from Statistics Sweden for 2012-2016.

### 2.3 Trade from Sweden

Statistics on the trade from Sweden were exclusively obtained from Statistics Sweden (2017b). Both the amount of trade in tons as well as the value in thousand SEK for the different products is reported. The proportion of the trade to countries within EU is given as % trade within EU in each table.

### 2.4 Production, distribution and economic value

For agricultural and horticultural production, i.e. cereals and vegetables, data on amount and value of the annual production were obtained from the Swedish Board of Agriculture (2017 a, b, c, d, e). The production value for the horticultural crops is calculated from the sum of the production of crops and the price the growers receive on the sale of each crop. For the agricultural crops, subsidies are included in the production value which is important to have in mind when comparing the two figures. When neither production amount nor area was available, these figures are left missing in tables without estimates.

The standing volumes of forest divided on different tree species were based on statistics from the Swedish National Forest Inventory (NFI; 2017). Production and distribution of

forestry was based on yearly felling volumes (Swedish Forest Agency, 2017b) and felled areas (Swedish Forest Agency, 2017c, d). Since the felled volume was reported as a total, estimates of volumes per tree species were made. The estimates are based on shares of round wood consumption of the most common tree species in Sweden, obtained from SDC (2017). The same approach was used to estimate amount felled area for the most common tree species. SDC (Skogsbrukets Datacentral) is an impartial organization jointly owned by the wood market parties and serves as an information hub regarding production information, stock movements and survey for wood, transport and biofuel stores.

The economic value of seedlings was estimated based on the average prices of seedlings from the pricelist of one of the largest suppliers of forest seedlings in Sweden, Svenska Skogsplantor (Svenska skogsplantor, 2017)

The total value of urban trees was calculated using the same model as in Hannunen et al. (2014). The model is based on the cost of removing a damaged or dead tree and to replace it with a new one. By multiplying this cost with the number of trees, divided by an estimated rotation time for the trees, the annual value for all urban trees in Stockholm was calculated. By extrapolating the value using the proportion of the population of Stockholm to the number of people living in urban areas in Sweden the total annual value of urban trees for Sweden as a whole could be estimated. The total number of street-trees in Stockholm municipality was estimated from figures obtained from the municipality administration (Britt-Marie Alvem, personal communication).

## 2.5 Complimentary information

In some cases, official data were missing for all or specific years, or was not available at a preferred resolution. To fill these gaps experts in different areas of government, leading companies and from the Swedish University of Agricultural Sciences where interviewed.

Examples of cases:

Swedish Forest Agency base their annual felling areas on a 5 year annual mean interval. Therefore, the data of the annual felled areas for 2015 and 2016 were obtained by personal contact with the Swedish Forest Agency (Claes Uggla, personal communication). These figures are thus estimates and the error may be greater than for the official data.

The Swedish NFI bases their annual data on running means of 5 year intervals. The same approach was used for the not yet published data on standing volume of the different tree species in Sweden. Personal contact with the Swedish NFI to get estimations for 2015 and 2016 (Jonas Friedman, personal communication).



## 3 Amount of trade to Sweden

The volume of traded plants and plant material to Sweden totaled a little more than 12 million tons, on a yearly average. Of this total, by far the largest part was different types of forestry products, 10 million tons, followed by fruit and other types of plant based food. Propagation materials for different production systems were in terms of amount a small proportion of the total volume of traded goods into Sweden, reaching almost 52 thousand tons.

### 3.1 Propagation material

On average 52 thousand tons of propagation material for different plants were traded to Sweden on a yearly basis (Table 1). The largest proportion of propagation material was ornamentals and other plants and trees, such as berry plants, fruit trees and landscaping plants, with a yearly average of 27 thousand tons. Propagation materials for forestry and arable crop production had slightly lower figures, with on average 12 thousand and 16 thousand tons, respectively (Table 1). However, the figures for forest trees and arable crops were much more variable than other categories of propagation material and possibly reflect the variability in the domestic production of seeds and seedlings or that material for several years was traded each time. For vegetable propagation material, the yearly average trade to Sweden was 6 thousand tons, which was approximately half the amount of trade to Sweden of propagation material for forestry.

Table 1. Annual trade of propagation material into Sweden, in tons, during 2012-2016.

Propagation material	Min	Max	Mean	Within EU
Ornamentals and other	16 347	19 420	17 919	98%
Arable crops	7 274	26 999	15 558	98%
Forestry	1 634	32 329	12 255	100%
Vegetables	5 119	8 210	6 146	97%
Sum	33 285	61 882	51 879	98%

#### 3.1.1 Forestry

Even though Sweden has a considerable domestic production of propagation material for forestry, there was still a notable trade of both seeds and seedlings into Sweden. An annual mean amount of 1.5 tons of seeds originates from outside of Sweden (Table 2). This was approximately 20 % of the amount of seeds used annually, in plant nurseries and for direct sowing. The highest proportion of seeds was Norway spruce and Scots pine with a yearly average of around 600 kg each, followed by oak with a yearly average of around 163 kg.

Table 2. Annual trade of seeds in kilograms by tree species during 2011-2015.

Species		Min	Max	Mean
<i>Fagus sylvatica</i>	European beech	0	60	20
<i>Larix sibirica</i>	Siberian larch	8	89	59
<i>Larix x marschlinsii</i>	Hybrid larch	1	11	4
<i>Picea abies</i>	Norway spruce	154	1 221	600

<i>Pinus sylvestris</i>	Scots pine	134	921	544
<i>Quercus</i> spp.	Oak	0	350	163
<i>Quercus petraea</i> *	Sessile oak	0	250	63
Sum		979	1 805	1 452

\**Quercus petraea* is separated from other *Quercus* spp.

Most seeds were traded from Finland, 44 %, followed by Denmark and Norway (Table 3). Seeds were also traded from Latvia, Lithuania and Belarus. The trade of seeds into Sweden may partly originate from Swedish cones that have been transported to for example Finland for seed extraction (Claes Ugglå, The Swedish Forest Agency, personal communication).

Table 3. Country of origin for seeds of forest trees traded into Sweden during 2011-2015.

Country	% of trade
Finland	44%
Denmark	19%
Norway	14%
Latvia	9%
Belarus	7%
Lithuania	5%
Poland	3%
Sum	100%

There was also a trade of forest seedlings. Approximately 39 million pieces of forest seedlings, equivalent to 10% of the domestic production during 2012-2015, were traded to Sweden (Table 4). The most dominant country of origin was Germany contributing with 61 %, followed by the Baltic states 25 % and the rest of the plants came from other Nordic or European countries (Table 5). These seedlings may originate from Swedish seeds, transported from Sweden for seedling development in for example Germany (Claes Ugglå, The Swedish Forest Agency, personal communication)

Table 4. Annual trade of seedlings, in million pieces, during 2012-2015.

Species		Min	Max	Mean
<i>Picea abies</i>	Spruce	29.7	34.9	32.2
<i>Pinus sylvestris</i>	Pine	0.4	1.9	1.5
	Foreign softwood species	3.0	4.6	3.6
	Hardwood species	1.8	2.3	2.1
Sum		37.4	41.7	39.3

Table 5. Country of origin of forest plants during 2012-2015.

Country	% of trade
Germany	61%
Baltic states	25%
Nordic countries	8%
Other European Countries	6%
Sum	100%

### 3.1.2 Arable Crops

The total amount of propagation material for arable crops, such as fodder plants, oil plants and cereals, traded to Sweden was on average 16 thousand tons from 2012 to 2014, where cereal seeds constituted the largest part (Table 6). In general, more than 95 % of the goods were traded from countries within the EU. However, for fodder plants this figure was slightly lower. In the group fodder plants the amount traded varied from on average 43 tons for lupin species (*Lupinus* spp.) to 550 tons for red Fescue (*Festuca rubra*) (Table 6). In general, more than 85 % of the fodder-plant seeds were traded from within the EU, except for the category other clover species (*Trifolium* spp.) and Italian ryegrass (*Lolium multiflorum*). Italian ryegrass was imported from the USA, 20% of the trade, as well as New Zealand, 30% of the trade (Appendix 1). New Zealand also contributed to the largest share of trade of other clover species, about 50% (Appendix 1).

For oil plants, sunflower (*Helianthus annuus*) seed constituted the highest amount of trade to Sweden, on average 1.7 thousand tons 2012-2016. This was the highest figure for any single species of arable crop reported, apart from wheat and durum wheat (Table 6).

Propagation material for cereals had by far the highest proportion of traded amount to Sweden of all the arable crops with an average total 2012-2016 of more than 10 thousand tons. The highest amount of cereal seeds traded to Sweden within the group was wheat (*Triticum aestivum*) with on average 3.5 thousand tons 2012-2016. The trade of millets (*Panicum* spp.) and sorghum (*Sorghum* spp.) seeds to Sweden was minor, around 20 tons (Table 6). Cereal seeds were almost exclusively traded from countries within the EU except for sorghum with 14 % traded from countries outside the EU.

Table 6. Annual trade into Sweden of propagation materials of arable crops, in tons, during 2012-2016.

Arable crops		Min	Max	Mean	Within EU
<b>Fodder plants</b>					
<i>Festuca pratensis</i>	Meadow fescue	1	21	8	92%
<i>Festuca rubra</i>	Red fescue	454	656	550	99%
<i>Festuca</i> ssp.	Fescue	14	109	75	100%
<i>Lolium multiflorum</i>	Italian ryegrass	30	117	63	49%
<i>Lolium perenne</i>	English ryegrass	396	511	468	86%
<i>Lupinus</i> spp.	Lupin	25	55	43	99%
<i>Medicago sativa</i>	Lucerne	48	153	113	93%

<i>Poa pratensis</i>	Kentucky bluegrass	120	156	140	97%
<i>Trifolium pratense</i>	Red clover	24	135	91	86%
<i>Trifolium</i> spp.	Other clover	72	202	118	41%
	Other fodder plants	152	761	394	99%
	Various <i>Poaceae</i> and <i>Vicia</i> species	76	208	142	80%
<b>Oil plants</b>					
<i>Brassica napus</i> subsp. <i>oleifera</i>	Rape and turnip rape	395	733	619	100%
<i>Glycine max</i>	Soybean	0	17	6	97%
<i>Helianthus annuus</i>	Sunflower seed	227	3 005	1 701	100%
<i>Linum usitatissimum</i>	Flaxseed	2	15	7	94%
<i>Sesamum indicum</i>	Sesame	0	17	3	100%
<i>Sinapis</i> spp.	Mustard	2	5	4	100%
<b>Cereals</b>					
<i>Avena sativa</i>	Oat	77	953	328	98%
<i>Hordeum vulgare</i>	Barley	492	1 392	1 025	98%
<i>Oryza sativa</i>	Rice	0	1	0	100%
<i>Panicum</i>	Millet	11	62	27	100%
<i>Secale cereale</i>	Rye	1 066	2 598	1 447	100%
<i>Sorghum</i>	Sorghum	0	54	20	86%
<i>Triticum aestivum</i>	Wheat	63	14 197	3 517	100%
<i>Triticum durum</i>	Durum wheat	31	12 915	2 931	100%
<i>Triticum spelta</i>	Spelt wheat	0	1 693	375	100%
<i>Zea mays</i>	Maize	409	586	486	100%
	Wheat and rye mixture	19	2 139	858	100%
Sum		7 274	26 999	15 558	98%

### 3.1.3 Vegetables

Almost all propagation material for vegetables used in Sweden, except for potatoes and onions, is traded to Sweden (Eva Anflo, The Federation of Swedish Farmers, personal communication). Still, the highest amounts traded to Sweden were seed onions and seed potatoes, due largely to the weight of individual items. The yearly average of traded seed onions and seed potatoes was more than 2 thousand tons during the period 2012-2016 (Table 7). The total amount of seeds traded for vegetables, except for beetroot (*Beta vulgaris* subsp. *vulgaris* var. *conditiva*), sweet corn (*Zea mays* var. *saccharata*) and common bean (*Phaseolus vulgaris*), was 371 tons (Table 7), among these vegetables carrots, iceberg lettuce and cauliflower were among the most common. Most of the vegetable seeds were traded from within the EU. However, only half of the beetroot and common bean trade was from countries within EU and on average 5 % of the sweet corn seeds (Table 7). Beetroot

and sweet corn were imported mainly from USA (Appendix 1). Common bean was traded from several countries such as USA and Turkey, with about 10 % each (Appendix 1).

Table 7. Annual trade of propagation materials into Sweden, in tons, during 2012-2016.

Vegetable		Max	Min	Mean	Within EU
<i>Allium cepa</i> Ceba Group	Onion	1 803	3 336	2 528	100%
<i>Beta vulgaris</i> subsp. <i>vulgaris</i> var. <i>conditiva</i>	Beetroot seeds	2	18	10	46%
<i>Phaseolus vulgaris</i>	Common bean	2	11	5	65%
<i>Pisum sativum</i>	Pea	437	1 859	1 031	83%
<i>Solanum tuberosum</i>	Potato	1 657	3 453	2 192	100%
<i>Zea mays</i> var. <i>Saccharata</i>	Sweet corn	0	18	9	5%
	Various vegetable seeds	206	633	371	95%
Sum		5 119	8 210	6 146	97%

### 3.1.4 Ornamentals and other berry and open field plants

The trade of propagation material for ornamentals and other plants to Sweden totaled 18 thousand tons, and included both seedlings, cuttings, onions, tubers, rhizomes and seeds (Table 8). Hence, the weight of different types of traded goods depends on both the traded amount as well as a considerable difference in weight of different items, such as different seeds and seedlings.

The trade of fruit trees and berry bushes to Sweden totaled 847 tons on average. Of this amount pineapple plants were reported separately in the statistics from Statistics Sweden and were equivalent to 9 tons.

Propagation material for open field plants, kitchen- and strawberry plants and various trees and bushes totaled a little more than 8 thousand tons. The goods included seedlings, small plants and cuttings. Among the propagation materials for open field plants reported separately, roses were on average 770 tons and rhododendron and azaleas 750 tons (Table 8).

Propagation material for ornamental plants is exclusively traded to Sweden. More than 8 thousand tons was traded to Sweden on a yearly basis during the period 2012 -2016. This included both onions, cuttings and to a minor extent seeds. Trade of tulip onions, other onions and tubers et.c., constituted the highest amount of trade in the category of ornamental propagation material with a total of more than 5 thousand tons (Table 8). Seeds for ornamental plants totaled 234 tons (Table 8).

Most of the propagation material for the production of ornamental plants was traded to Sweden from countries within the EU, very often close to a 100 %. However, most of the material originates from outside the EU, from countries such as Ethiopia, Israel, Kenya, and is only traded via EU countries, most commonly Holland and Germany (Eva Anflo, The Federation of Swedish Farmers, personal communication).

Table 8. Annual trade of propagating materials for ornamentals and other plants, in tons, during 2012-2016.

<b>Ornamentals and other berry and open field plants</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>Within EU</b>
<b>Fruit and berries</b>				
Fruit trees and berry bushes	679	1 107	838	100%
Pineapple plants	4	16	9	96%
<b>Open field</b>				
Kitchen- and strawberry plants	567	1 704	1 187	99%
Roses	585	986	770	98%
Rhododendron and azalea	689	910	752	100%
Cuttings and seedlings of trees and bushes	277	831	575	100%
Other	4 943	6 571	5 831	100%
<b>Ornamentals</b>				
Tulip bulbs	3 624	4 157	3 778	100%
Pot plant cuttings and grafts	239	1 351	868	100%
Narcissus bulbs	528	795	668	100%
Cuttings and grafts	428	1 122	637	100%
Hyacinthus bulbs	469	533	487	100%
Flower seeds	121	378	234	99%
Gladiolus bulbs	5	28	20	100%
Other tubers, corms, bulbs and rhizomes	886	1 548	1 265	79%
Sum	16 347	19 420	17 919	98%

### 3.2 Other plant products and plant materials

Other types of plants and plant products traded into Sweden were categorized into wood products, food products (fruit and berries, vegetables and arable crops) and ornamental plants for direct sale.

Among other plant materials traded into Sweden, the category “wood products” was the most dominating in terms of weight, with a little more than 10 million tons in total (Table 9). The second largest amount was the category “fruit and berries”, with a yearly average of 680 thousand tons.

Table 9. Annual trade of other plant products and plant materials into Sweden, in tons, during 2012-2016.

<b>Other plant products and plant materials</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>Within EU</b>
Wood products	9 579 641	11 243 602	10 365 855	61%
Fruit and berries	660 885	701 192	680 461	69%
Vegetables	398 691	422 175	411 196	98%
Arable crops	277 163	397 611	341 350	96%

Ornamentals and other	49 353	57 542	54 119	100%
Sum	11 099 594	12 749 791	11 852 950	64%

### 3.2.1 Wood products

Among the 10 million tons of wood products traded to Sweden the largest proportions were different qualities of sawn timber of spruce, pine and birch, all in amounts of around a million ton or more (Table 10). Soft wood chips and saw dust also constituted a large proportion of the wood products, 1.3 million tons.

On average, just a little more than 50 % of the wood products on average were traded from within the EU. For example, for sawn wood of spruce and poplar the proportion traded from within EU was less than 20 %. Sawn spruce was mainly traded from Norway (about 90%) and the roughly sawn poplar was mainly imported from the USA (Appendix 1).

Table 10. Annual trade of wood products into Sweden, in tons, during 2012-2016.

Wood products		Min	Max	Mean	Within EU
<b>Boards</b>					
	Particle boards	289 660	342 516	322 875	74%
	Fiber board	219 877	239 803	234 129	93%
	Plywood	83 972	99 961	90 405	63%
<b>Sawn wood</b>					
<i>Acer</i> spp.	Maple	86	525	258	48%
<i>Fagus sylvatica</i>	European beech	1 835	2 158	1 953	30%
<i>Fraxinus</i> spp.	Ash	1 577	2 671	2 022	44%
<i>Picea abies</i>	Norway spruce	95 640	127 450	114 550	2%
<i>Pinus sylvestris</i>	Scots pine	51 275	63 236	58 002	36%
<i>Prunus</i> spp.	Cherry	51	151	119	17%
<i>Quercus</i> spp.	Oak	10 723	23 535	15 698	48%
	Other softwood	24 939	28 957	27 172	35%
	Tropical species	415	846	623	52%
<b>Veneer sheets</b>					
	Softwood	1 987	5 286	2 945	99%
	Tropical tree species	287	527	379	84%
	Other tree species	4 123	5 766	5 118	77%
<b>Saw dust and waste wood</b>					
	Softwood chips and saw dust	886 460	1 310 551	1 005 733	73%
	Hardwood chips and saw dust	40 569	101 492	71 534	92%
	Saw dust	0	71 232	23 389	1%
	Wood waste	0	788 688	532 188	29%

	Wood pellets	267 645	712 640	470 104	51%
	Wood waste and scrap, agglomerated	0	23 725	15 204	40%
<b>Sawn timber</b>					
<i>Betula</i> spp.	Birch	24	1 012	295	96%
<i>Fagus sylvatica</i>	European beech	7	73	38	100%
<i>Picea abies</i>	Norway spruce	353 334	713 791	545 410	19%
<i>Pinus sylvestris</i>	Scots pine	295 040	381 825	335 536	36%
<i>Quercus</i> spp.	Oak	14 866	25 253	20 085	93%
	Other softwood	97	47 732	19 927	77%
<b>Roughly sawn wood</b>					
<i>Betula</i> spp.	Birch	1 266 386	2 392 142	1 779 796	75%
<i>Eucalyptus</i>	Eucalyptus	0	1 471	295	0%
<i>Fagus sylvatica</i>	European beech	96 057	120 325	105 038	100%
<i>Picea abies</i>	Norway spruce	641 227	1 052 616	818 565	34%
<i>Pinus sylvestris</i>	Scots pine	2 002 663	2 750 609	2 398 525	59%
<i>Populus</i> spp.	Poplar	0	52	24	13%
<i>Quercus</i> spp.	Oak	197	2 326	1 142	35%
	Other tree species	647 421	1 079 821	902 686	96%
	Other softwood	3 596	9 7042	56 923	55%
	Tropical tree species	85	439	262	76%
<b>Fuelwood</b>					
	Fuelwood	144 756	360 401	266 979	55%
<b>Other products</b>					
	Pallet and pallet collars	39 969	133 403	98 870	42%
	Box pallets and similar	6 107	11 877	9 297	50%
	Packing cases, boxes, crates and similar	4 309	7 863	6 548	94%
	Cable drum	1 485	5 068	2 833	68%
	Hoopwood; split poles; piles, pickets and stakes of softwood	663	1 890	1 161	89%
	Railroad ties	44	1 744	727	100%
	Excelsior	403	532	487	97%
	Hoopwood; split poles; piles, pickets and stakes of hardwood	1	14	4	32%
Sum		9 579 641	11 243 602	10 365 855	61%



### 3.2.2 Food products

In total 341 thousand tons of arable crops were traded to Sweden on a yearly basis 2012-2016 as food products (Table 11). The most commonly traded crops were cereals, first and foremost wheat, almost 170 thousand tons, as well as triticale and barley, between 50 thousand and 60 thousand tons. Other cereals such as rye and oats were traded with an amount of between 4 thousand and 9 thousand tons, respectively. Fodder plants were traded to Sweden to a lesser extent than most cereals (Table 11).

Most of the arable crops, in general more than 90 %, were traded to Sweden from other countries within the EU (Table 11). However, quinoa and millet were to a larger extent imported from countries outside the EU, 25 and 38 %, respectively.

Table 11. Annual trade of arable crops into Sweden, in tons, during 2012-2016.

Arable crops		Min	Max	Mean	Within EU
<b>Cereals</b>					
<i>Avena sativa</i>	Oats	2 219	20 795	8 526	100%
<i>Chenopodium quinoa</i>	Quinoa	205	790	496	62%
<i>Fagopyrum esculentum</i>	Buckwheat	149	209	183	94%
<i>Hordeum vulgare</i>	Barley	24 812	76 766	50 307	100%
<i>Panicum</i>	Millet	220	470	289	75%
<i>Phalaris canariensis</i>	Cannary-seed	74	129	104	0%
<i>Secale cereale</i>	Rye	2	10 453	4 945	100%
<i>Sorghum</i>	Sorghum	0	56	12	98%
<i>Triticale</i>	Triticale	11 991	125 419	59 547	100%
<i>Triticum durum</i>	Durum wheat	5 879	41 871	25 026	99%
<i>Zea mays</i>	Corn	17 948	31 612	23 483	73%
	Wheat and mixed grain	136 024	246 867	167 372	95%
	Other cereals	80	285	191	83%
<b>Fodder plants</b>					
	Forage products	477	1 115	776	96%
	Swedes, mangolds and fodder roots	16	165	92	85%
Sum		277 163	397 611	341 350	96%

Among the 411 thousand tons of vegetables traded to Sweden, tomato was the single most common, 91 thousand tons (Table 12). This was almost double the amount of the second most commonly traded vegetable potato, 5 thousand tons.

Most of the vegetables were traded to Sweden from countries within the EU, very often close to 100 %. However, it is obvious for some vegetables, such as avocado, that they were traded via other EU countries and originates in other parts of the world such as South America. However, this cannot be traced in the available data.

Table 12. Annual trade of vegetables and mushrooms, in tons, during 2012-2016.

<b>Vegetables</b>		<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>Within EU</b>
<i>Allium cepa</i> <i>Aggregatum</i> -gruppen	Scallion	541	632	581	100%
<i>Allium cepa</i> <i>Cepa</i> Group	Onion	21 638	30 186	26 307	94%
<i>Allium sativum</i>	Garlic	3 052	3 224	3 142	93%
<i>Allium</i> spp.	Leek and other Allium	7 229	8 891	8 071	99%
<i>Apium graveolens</i> var. <i>dulce</i>	Celery	878	1 243	1 087	100%
<i>Apium graveolens</i> var. <i>Rapaceum</i>	Celeriac	1 097	2 077	1 430	100%
<i>Armoracia rusticana</i>	Horseradish	1	286	136	98%
<i>Asparagus officinalis</i>	Asparagus	2 129	2 777	2 573	100%
<i>Beta vulgaris</i> och <i>Plein Blanc Amélioré</i>	Chard and cardoon	139	241	192	92%
<i>Brassica oleracea</i> <i>Botrytis</i> Group	Cauliflower and broccolo	9 233	10 999	10 026	100%
<i>Brassica oleracea</i> <i>Capitata</i> Group	Red and white cabbage	21 135	24 143	22 368	97%
<i>Brassica oleracea</i> <i>Gemmifera</i> Group	Brussels sprouts	1 064	1 443	1 253	100%
<i>Brassica oleracea</i> <i>Gongylodes</i> Group, <i>B. oleracea</i> <i>Sabellica</i> Group	Kale	5 120	7 671	6 560	98%
<i>Capparis spinosa</i>	Caprice	0	26	11	100%
<i>Capsicum annum</i>	Sweet peppers	26 988	31 304	28 567	97%
<i>Capsicum</i> and <i>Pimenta</i>	Fruit from Capsicum and Pimenta	1 236	2 771	1 842	80%
<i>Cucumis sativus</i>	Cucumber	29 833	36 926	33 646	99%
<i>Cucurbita pepo</i>	Zucchini	4 333	6 221	5 208	96%
<i>Cucurbita</i> spp.	Cucurbits	952	1 896	1 525	91%
<i>Cynara cardunculus</i>	Globe artichoke	693	3 298	1 776	100%
<i>Daucus carota</i> subsp. <i>sativus</i> , <i>Brassica rapa</i>	Carrot and garden turnip	8 650	13 600	10 776	99%
<i>Foeniculum vulgare</i>	Fennel	964	1 479	1 203	100%
<i>Ipomoea batatas</i>	Sweet potato	1 329	2 852	1 793	89%
<i>Lactuca</i> spp.	Lettuce	6 794	10 072	7 716	100%
<i>Lactuca</i> spp.	Other lettuce	1 186	2 609	1 999	100%
<i>Persea americana</i>	Avocado	17 879	19 656	18 925	95%
<i>Phaseolus</i> , <i>Vigna</i>	Beans	1 253	1 642	1 454	98%
<i>Pisum sativum</i>	Peas	825	985	921	99%
<i>Solanum lycopersicon</i>	Tomato	87 931	93 406	91 009	99%
<i>Solanum melongena</i>	Eggplant	4 141	5 415	4 520	96%
<i>Solanum tuberosum</i>	Potato	48 497	56 170	51 120	98%
<i>Spinacia oleracea</i>	Spinach	1 454	1766	1 607	99%
<i>Zea mays</i> var. <i>Saccharata</i>	Sweet corn	1 422	2 849	2 227	99%

	Other vegetables	4 229	14 945	9 060	96%
	Head lettuce	27 318	32 224	30 147	100%
	Other edible roots	5 188	8 749	7 484	100%
	Chicory	365	691	459	100%
	Olives	32	1 112	402	100%
	Leguminous vegetables	40	73	55	63%
<b>Mushrooms</b>					
<i>Agaricus</i>	Agaricus group	9 270	11 812	10 530	100%
<i>Boletales</i>	Boletus	0	3	1	100%
<i>Cantharellaceae</i>	Chanterelle	49	178	89	98%
<i>Tuber</i>	Truffle	1	11	5	100%
	Other mushrooms	779	1 567	1 393	100%
Sum		398 691	422 175	411 196	98%

In total, a little more than 680 thousand tons of fruits and berries were traded to Sweden on a yearly basis (Table 13). Of the fruits traded, bananas constituted the largest amount with almost 194 thousand tons traded to Sweden each year on average. Bananas were followed by apples and oranges with approximately 90 thousand tons each traded every year (Table 13)

Many of the fruits were traded directly to Sweden from outside the EU. For example, only 31 % of the bananas and 67 % of the clementines were traded from countries within the EU (Table 13). However, a large proportion of the fruits are probably imported from countries outside of the EU and then traded via other EU countries.

Table 13. Annual trade of fruit and berries into Sweden, in tons, during 2012-2016.

Fruit and berries		Min	Max	Mean	Within EU
<b>Nuts</b>	Coconut, brazil and cashew	4 260	5 032	4 673	47%
	Other nuts	10 789	12 147	11 463	48%
<b>Fruit</b>					
<i>Citrus aurantifolia, Citrus latifolia</i>	Lime	3 871	6 503	4 955	99%
<i>Actinidia deliciosa</i>	Kiwi fruit	9 858	11 102	10 465	99%
<i>Ananas comosus</i>	Pineapple	7 782	10 234	9 137	88%
<i>Carica papaya</i>	Papaya	271	388	324	88%
<i>Citrullus lanatus</i>	Water melon	25 861	34 056	29 952	95%
<i>Citrus × Sinensis</i>	Orange	83 808	95 906	90 313	78%
<i>Citrus × aurantium Amara</i>	Bitter orange	693	882	785	99%
<i>Citrus × aurantium Paradisi</i>	Grapefruit	6 827	8 617	7 549	56%

<i>Citrus clementina</i> hort. ex <i>Tanaka, Citrus reticulata</i> <i>Unshiu</i>	Monreal clementine and satsumas	7 694	11 099	8 979	98%
<i>Citrus limon, Citrus</i> <i>limonum</i>	Lemmon	18 960	21 605	20 257	92%
<i>Citrus reticulata</i> <i>Clementina</i>	Clementine	26 931	40 297	33 163	67%
<i>Citrus reticulata</i> <i>Tangerina</i>	Tangerine	53	554	302	97%
<i>Cucumis melo</i>	Melon	24 414	31 624	27 778	98%
<i>Cydonia oblonga</i>	Quince	60	195	116	45%
<i>Diospyros kaki</i>	American persimmon	1 468	1 918	1 679	72%
<i>Durio</i>	Durian	4	38	15	86%
<i>Ficus carica</i>	Fig	323	554	410	94%
<i>Malus</i>	Apple	87 239	96 449	91 707	84%
<i>Musa</i>	Bananas	181 239	205 786	193 779	31%
<i>Musa</i>	Cooking bananas	158	3 022	1 393	85%
<i>Phoenix dactylifera</i>	Date	2 023	3 351	2 560	26%
<i>Prunus</i>	Cherry	641	4 258	2 389	78%
<i>Prunus armeniaca</i>	Apricots	994	1 856	1 356	98%
<i>Prunus cerasus</i>	Sour cherry	0	312	112	100%
<i>Prunus persica</i>	Peach	6 230	6 814	6 606	100%
<i>Prunus persica</i> var. <i>Nucipersica</i> , var. <i>Nectarina</i>	Nectarine	16 623	18 346	17 479	100%
<i>Prunus</i>	Plum	4 667	5 922	5 129	97%
<i>Psidium guajava</i> , <i>Mangifera indica</i> , <i>Garcinia mangostana</i>	Guava, mango and mangosteen	4 149	5 255	4 457	92%
<i>Pyrus</i>	Pear	29 405	36 643	33 361	93%
	Table grapes	13 442	20 358	15 638	75%
	Wine grapes	7 978	12 820	9 675	100%
	Mandarin	8 380	11 190	9 178	79%
	Other fruits	6 062	9 755	7 619	81%
	Tangelo, Ortanique tangor and similar citrus hybrids	1 288	3 327	2 350	15%
	Other citrus	526	1 222	834	97%
	Tamarind, cashew apple, lychee, jackfruit, sapodilla plums, passionfruit, carambola and pitahaya	548	1 508	787	90%
<b>Berries</b>					
<i>Fragaria × ananassa</i>	Strawberry and wild strawberry	6 976	7 824	7 468	100%
<i>Prunus spinosa</i>	Blackthorn	0	10	4	0%

<i>Ribes nigrum</i>	Blackcurrant	0	11	2	100%
<i>Ribes Rubrum</i> Group	Redcurrant	24	45	34	100%
<i>Ribes Rubrum</i> Group, <i>R. uva-crispa</i>	Whitecurrant and gooseberry	0	13	3	100%
<i>Rubus idaeus</i>	Raspberry	568	1 240	1 008	100%
<i>Vaccinium macrocarpon</i> , <i>V. corymbosum</i>	Cranberry, blueberry	182	636	401	94%
<i>Vaccinium myrtillus</i>	Blueberry	587	1 449	909	94%
<i>Vaccinium</i> spp.	Other <i>Vaccinium</i> species	37	149	66	98%
<i>Vaccinium vitis-idaea</i>	Lingonberry	1 433	1 784	1 618	81%
	<i>Rubus</i> species of the Blackberry Group	40	347	180	100%
Sum		660 885	701 192	680 461	69%

### 3.2.3 Flowering plants, other living plants and other plant products

Some plants and plant products are traded to Sweden for direct sale, i.e. they are not further grown at plant nurseries before being sold to end consumers. Seedlings and small plants for direct sale are also included in this group of materials. Moreover, materials such as lichens and fungal mycelium are also reported here.

On average 54 thousand tons of plant materials for direct sale were traded to Sweden each year (Table 14). Almost 100 % of the plants and plant material traded to Sweden for direct sale comes from countries within the EU. However, most of the indoor plants and cut flowers or their propagation materials originates in countries outside EU but are traded via, and sometimes further grown in, other EU countries.

Table 14. Annual trade of flowering and other living plants into Sweden, in tons, during 2012-2016.

		Min	Max	Mean	Within EU
<b>Cut flower</b>					
<i>Rosa</i>	Roses	3 761	4 214	4 029	100%
<i>Dianthus caryophyllus</i>	Carnations	363	441	417	100%
<i>Gladiolus</i>	Gladiolus	120	262	176	100%
<i>Krysantemum</i>	Chrysanthemums	991	1 103	1 038	100%
<i>Lilium</i>	Lilies	464	771	597	100%
<i>Orchidaceae</i>	Orchids	27	90	56	98%
<i>Ranunculus</i>	Ranunculus	0	189	38	100%
	Other cut flowers	0	2 986	597	100%
<b>Indoor plants</b>					
	Flowering plants	15 837	20 338	18 115	100%
	Pot plants and cactuses	11 237	13 242	12 077	100%
	Orchids, hyacinth, narcissus, and tulips in growth or in flower	1 304	1 738	1 498	100%

Chicory plants and roots	188	453	287	100%
Other bulbs, tubers, tuberous roots, corms, crowns and rhizomes, in growth or in flower	750	1063	909	100%
<b>Other</b>				
Open field plants, trees and bushes	9 988	12 855	11 291	100%
Christmas trees	1 443	2 138	1 799	100%
Softwood branches	505	820	632	100%
Foliage, branches and other parts of plants	333	553	424	100%
Reindeer lichen	33	276	96	53%
Fungal mycelium	0	80	32	35%
Mosses and other lichens	5	15	11	78%
<b>Sum</b>	<b>49 353</b>	<b>57 542</b>	<b>54 119</b>	<b>100%</b>

## 4 Trade from Sweden

The amount of plants and plant products traded from Sweden totaled more than 9 million tons, with an annual yearly value of approximately 30 billion SEK. Hence, trade from the country was less than trade into the country, which was 12 million tons. Similaras for the trade to Sweden, the trade from Sweden was dominated by wood products, with a yearly average of 7.5 million tons.

### 4.1 Propagation material

In total, 49 thousand tons of propagation materials were traded from Sweden, with a total value of 276 million SEK (Table 15). The amount of propagation material traded from Sweden was hence more or less equal to the amount traded into Sweden, which was almost 52 thousand tons. Almost two thirds of the value of traded propagation materials to Sweden, 188 million SEK, came from trade with propagation materials for arable crops.

#### 4.1.1 Forestry

The trade of seeds for forest trees was very variable. Between the years 2012 to 2016 the trade from Sweden varied between 0 and 1 427 tons, average 287 tons (Table 15). This possibly reflects the large annual fluctuation in domestic seed production. Hence, since we traded 1.4 tons of seeds for forestry in to Sweden, trade from the country was on average a factor 200 higher. The amount of seedlings traded from Sweden was much more constant over the years than seeds, with an annual average of 793 tons. The total trade in to Sweden of forest propagation materials (in weight mostly seedlings) varied between 1.6 thousand and 32 thousand tons, and was hence much higher than the amount traded from Sweden. The total value of trade of forestry propagation material from Sweden was on average 18 million SEK.

Table 15. Annual trade of forestry propagation materials from Sweden, amount in tons and value in kSEK, during 2012-2016.

Forestry	Min	Max	Mean	Within EU	Value (kSEK)
Seedlings	537	922	793	74%	15 568
Seeds	0	1 427	287	96%	2 868
Sum	538	2 349	1 080	80%	15 568

#### 4.1.2 Arable crops

Among propagation materials for arable crops the highest amount traded from Sweden was for cereals, with a little more than 28 thousand tons on average(table 16). As for the trade in to Sweden, there was also a considerable variation in trade of arable crops from Sweden, especially for cereals and oil plants. On average, we traded more propagation materials for arable crops, 40 thousand tons, from Sweden than we traded in to the country, 15.6 thousand tons. The value of trade of propagation materials for arable plants from Sweden totaled on average 188 million SEK per year.

Table 16. Annual trade of propagation materials of arable crops from Sweden, amount in tons and value in kSEK, during 2012-2016.

Arable crops	Min	Max	Mean	Within EU	Value (kSEK)
Cereals	5 404	78 210	28 451	86%	62 726
Oil plants	2 870	19 865	8 234	96%	41 915
Fodder plants	2 212	3 851	3 366	78%	83 291
Sum	22 674	87 248	40 052	87%	187 932

### 4.1.3 Vegetables

In economic terms the trade from Sweden of propagation materials for vegetables was mostly in the form of vegetable seeds (Table 17), with a yearly average value of 23 million SEK corresponding to an amount of 2 thousand tons. This was more than twice the amount of all other propagation materials of vegetables traded from Sweden.

Table 17. Annual trade of propagation materials of vegetables from Sweden, amount in tons and value in kSEK, during 2012-2016.

Vegetables	Min	Max	Mean	Within EU	Value (kSEK)
Peas, beans, corn	712	4 210	2 112	94%	6 346
Vegetable seeds	1 383	3 362	2 090	99%	23 107
Potato	36	36	325	81%	1 562
Onion	46	46	115	90%	2 675
Sum	2 703	7 707	4 641	95%	33 690

### 4.1.4 Other plants

Propagation materials for other plants were mostly for ornamental plants and different open field plants. The value of the trade totaled 36 million SEK. It was not possible to determine in detail which types of propagation materials contribute the most to the total value using the available data. However, it is likely that a significant part of the value was from trading propagation materials for ornamentals.

Table 18. Annual trade of propagation material for other plants from Sweden, amount in tons and value in kSEK, during 2012-2016.

Propagation material	Min	Max	Mean	Within EU	Value (kSEK)
Other plant material	1 838	4 535	2 817	82%	36 136



## 4.2 Other plant products and plant materials

The annual amount of other plant products and materials traded from Sweden totaled 9 million tons, to a total value of almost 30 billion SEK. Most of this trade was in the form of different wood products. Trade of food products totaled 1.5 million tons annually to a value of 3.6 billion SEK, while only a very minor part, 1.7 thousand tons to a value of 21 million SEK, was trade of flowering plants, other living plants and other plant products.

### 4.2.1 Wood products

Wood products had by far the highest value of all surveyed groups of plant materials, with an average yearly total value of 26 billion SEK and an average yearly traded amount from Sweden of 7.5 million tons (Table 19). Trade of wood products from Sweden was dominated by sawn spruce and pine, both in terms of amount and value, with a yearly amount of around 3 million tons each, and an economic value at around 11 billion SEK each, which together constituted almost 85 % of the value of all wood products. The total amount of wood products traded from Sweden was less than the total amount traded to the country, which was approximately 10 million tons. However, the trade from Sweden of sawn spruce and pine was between 30 and 40 times higher than the corresponding trade to Sweden.

Table 19. Annual trade of wood and wood products from Sweden, amount in tons and value in thousand SEK, during 2012-2016.

Wood and wood products		Min	Max	Mean	Within EU	Value (kSEK)
<b>Fuelwood</b>						
	Fuelwood	10 761	45 593	21 848	68%	20 755
<b>Roughly sawn wood</b>						
<i>Betula</i> spp.	Birch	2 772	9 922	6 920	92%	22 953
<i>Fagus sylvatica</i>	European beech	148	1 818	560	100%	259
<i>Picea abies</i>	Norway spruce	193 452	305 793	243 292	6%	115 798
<i>Pinus sylvestris</i>	Scots pine	9 177	72 283	46 039	93%	47 154
<i>Quercus</i> spp.	Oak	149	1 737	907	7%	5 018
	Other softwood	2 472	33 703	16 631	94%	10 374
	Other	1 175	7 992	5 197	89%	4 576
<b>Veneer sheets</b>						
	Softwood	13 218	15 386	14 238	83%	144 898
	Other	58	124	96	58%	5373
<b>Sawdust and waste wood</b>						
	Sawdust and waste wood	370 983	589 409	491 720	58%	488 746
<b>Sawn wood</b>						
<i>Picea abies</i>	Norway spruce	2 657 557	3 363 342	3 058 603	67%	11 949 273
<i>Pinus sylvestris</i>	Scots pine	2 883 429	3 097 879	3 009 393	35%	10 418 779
	Other softwood	123 097	253 324	174 141	73%	780 968
	Other	1 534	10 100	5 003	13%	30 218
<b>Sawn timber</b>						

<i>Picea abies</i>	Norway spruce	98 430	174 435	139 211	35%	137 775
<i>Pinus sylvestris</i>	Scots pine	61 668	121 039	88 527	52%	84 579
	Hardwood	123	5 594	1 824	97%	2 230
	Other softwood	580	15 464	8 247	93%	8 588
<b>Wood-based panels</b>						
	Wood-based panels	91 162	120 351	109 192	53%	964 898
<b>Other products</b>						
	Other products	77 571	105 509	93 495	61%	465 688
<b>Sum</b>						
		7 154 848	7 902 730	7 535 084	51%	25 708 900

## 4.2.2 Food products

A total of 1.5 million tons of plant based food products were traded from Sweden on a yearly basis (Table 20) at an average annual value of approximately 21 billion SEK. Cereals, and thus arable crops, dominated the trade of plant based food products from Sweden with a yearly average of around 1.4 million tons and a yearly value of almost 2.5 billion SEK. This is more than the yearly average of 300 thousand tons of cereals that was traded to Sweden. Vegetables were traded from Sweden with a total value of around 300 million SEK.

Fruits and berries at an amount of approximately 41 thousand tons were traded from Sweden on a yearly basis (Table 20), to an average value of approximately 600 million SEK.

Table 20. Annual trade food products from Sweden, amount in tons and value in kSEK, during 2012-2016.

Food products		Min	Max	Mean	Within EU	Value (kSEK)
<b>Fruit and berries</b>						
	Fruit	30 496	45 355	40 168	94%	403 622
	Berries	1 354	12 816	6 963	80%	136 785
	Nuts	1 291	1 894	1 466	92%	107 838
<b>Vegetables</b>						
<i>Cucumis sativus</i>	Cucumber	96	2 345	764	94%	5 774
<i>Solanum lycopersicum</i>	Tomato	571	2 427	1 608	97%	23 002
<i>Solanum tuberosum</i>	Potato	7 320	11 767	10 146	51%	37 364
<i>Vign, Phaseolus</i>	Beans of Vign and Phaseolus	266	4 254	2 508	84%	6 279
	Lettuce	7 142	9 262	8 081	99%	150 258
	Other vegetables	3 349	4 402	3 884	66%	74 583
	Carrots and turnip	271	1 875	832	87%	6 946
<b>Arable crops</b>						
<i>Avena sativa</i>	Oats	184 422	282 634	217 205	70%	391 958
<i>Hordeum vulgare</i>	Barley	365 141	508 184	462 314	76%	847 325

<i>Secale cereale</i>	Rye	24 472	110 372	49 530	58%	80 276
	Wheat and mixgrain	229 551	1 178 437	693 875	60%	120 1283
	Other cereals	9 394	33 678	19 497	97%	44 554
	Hay, clover, lupines and similar forage products	9 993	2 4251	17 446	0%	34 468
	Swedes, mangolds and fodder roots	7	63	36	0%	93
	Sum	911 499	2 048 133	1 536 323	67%	3 552 408

### 4.2.3 Flowering plants, other living plants and other plant products

Flowering plants, other living plants, such as Christmas trees, and other products, such as lichens, constituted a very minor part of the traded plant material from Sweden. Together the trade totaled 1.7 thousand tons to a value of 21 million SEK, on an average annual basis (Table 21). The highest amount traded from Sweden was for Reindeer lichen, with an annual mean of 913 tons and a value of approximately 4.1 million SEK. Except for the group “other products” indoor plants and cactuses had the highest economic value, 4.3 million SEK, with an annual mean amount of 182 tons traded from Sweden. Flowering plants and Christmas trees were traded from Sweden at a similar value as the other groups, around 4 million SEK.

Table 21. Annual trade of flowering plants, other living plants and other plant products from Sweden, amount in tons and value in kSEK, during 2012-2016.

Other plant and plant materials		Min	Max	Mean	Within EU	Value (kSEK)
<i>Cladonia rangiferina</i>	Reindeer lichen	1	1 573	913	99%	4 085
	Christmas trees	123	503	308	66%	3 956
	Indoor plants and cactus	41	509	182	50%	4 341
	Flowering plants with buds or flowers	0	317	88	96%	4 262
	Other products	87	343	219	31%	4 610
	Sum	765	2 530	1 710	79%	21 254

## 5 Production and economic value

The production of plants and plant materials were dominated by forestry and forest trees, with a total standing volume of 3.5 billion m<sup>3</sup> on an area of approximately 28 million ha (National Forest Inventory, 2017b). Arable plants and products were produced at an annual average amount of 34 million tons and vegetables at an average amount of more than 287 thousand tons. The total area used annually for production of vegetables and arable crops was 3.8 million ha. Production of fruits and berries as well as ornamental plants was very minor in terms of area and amount produced, however the economic value was relatively high.

The annual economic value of plants and plant products from Sweden totaled nearly 53 billion SEK, which was 1.6 times the value of the trade of plants and plant products from Sweden. Most of the production value was related to forestry, just over 27 billion SEK, and arable plants, reaching almost 20 billion SEK.

The economic value of the production of vegetables, ornamentals and other plants equaled approximately 2 billion SEK each. Fruits and berries constituted a rather small part of plants and plant products produced with an annual average value of a little less than 800 million SEK.

### 5.1 Forestry

Sweden is covered by approximately 28 million ha of forest – defined as a tree height of at least 5 m and with a crown coverage of at least 10% (UN:s Food and Agriculture Organizations, FAO, definition (FRA, 2012)). Of the total area of forest, 23 million ha are defined as productive forests (Swedish National Forest Inventory, 2017c).

Swedish forests are dominated by two tree species, Norway spruce and Scots pine, which together constitutes 80 % of the standing volume of 1.4 billion m<sup>3</sup> standing wood each (Table 22). The next most common after pine and spruce is birch (*Betula pendula* and *B. pubescens* together), which has a standing volume on 433 million m<sup>3</sup> standing wood. Other relatively common tree species such as alder, aspen, oak and contorta pine all have an average standing volume of around 50 million m<sup>3</sup> standing wood.

Table 22. Annual standing volume of forest trees, in million cubic meter standing volume, during 2012-2016.

Species		Mean
<i>Acer platanoides</i>	Norway maple	2.8
<i>Alnus</i> spp.	Alder	56.2
<i>Betula</i> spp.	Birch	433.3
<i>Carpinus betulus</i>	Hornbeam	0.9
<i>Fagus sylvatica</i>	European beech	23.9
<i>Fraxinus excelsior</i>	Ash	5.4
<i>Larix</i> spp.	Larch	1.7
<i>Picea abies</i>	Norway spruce	1 419.7
<i>Pinus contorta</i>	Contorta pine	43.9
<i>Pinus sylvestris</i>	Scots pine	1 369.0
<i>Populus tremula</i>	Aspen	57.6
<i>Prunus avium</i>	Wild cherry	1.0
<i>Quercus</i> spp.	Oak	44.9
<i>Salix caprea</i>	Willow	16.6
<i>Sorbus acuparia</i>	Rowan	7.0
<i>Tilia</i> spp.	Lime	1.2
<i>Ulmus</i> spp.	Elm	2.1
	Other hardwoods	4.4
Sum		3 491.4

The average yearly harvested volume of forest trees in Sweden totaled, 87 million m<sup>3</sup> standing wood to a value of 27 billion SEK. The production value of Scots pine and Norway spruce was around 11 and 13 billion SEK respectively (Table 23). This could be compared with the value of sawn pine and spruce traded from Sweden, which was very similar, around 11 billion SEK each. The production value of birch was 2 billion SEK, 7.6 milj m<sup>3</sup> standing wood.

Table 23. Annual mean volume harvested forest trees, felling area and economic value, during 2012-2016.

Species		Volume, M m <sup>3</sup> standing wood	Area, k ha	Gross felling value, M SEK
<i>Betula</i> spp.	Birch	8	45	2 341
<i>Picea abies</i>	Norway spruce	43	257	13 436
<i>Pinus sylvestris</i>	Scots pine	35	206	10 771
	Other hardwoods	2	10	497
Sum		87	518	27 045

A total of 363 million seedlings of forest trees were produced annually in Sweden on average (Table 24), approximately 110 million tons. Hence, the 793 tons of seedlings we trade from Sweden was only a very minor part of the seedlings produced. The amounts of Norway spruce and Scots pine were rather similar with a slightly higher figure for Norway spruce with an annual mean of 197 million pieces compared to Scots pine with 144 million pieces produced.

Table 24. Annual mean production of forest tree seedlings and economic value, during 2012-2016.

Species		M pieces	Economic value, M SEK
<i>Betula</i> spp.	Birch	1.5	7.3
<i>Picea abies</i>	Norway spruce	197.2	631.2
<i>Pinus contorta</i>	Contorta pine	12.8	41.0
<i>Pinus sylvestris</i>	Scots pine	143.5	459.3
	Other softwoods	5.6	28.8
	Other hardwoods	2.0	13.4
Sum		362.7	1 180.9

## 5.2 Urban trees

The economic value of park- and street trees in cities are not part of the commercial forestry but have a high economic value for county- and municipality administrations.

The cost for replacing a single park tree is on average 30 000 SEK and on average 70 000 SEK for a street tree. If calculated with a mean rotation-time of 80 years (Hannunen et.al., 2014) for both park- and street trees, the annual value for urban trees in Stockholm municipality totals 144 million SEK. With 8 696 023 people living in urban areas in Sweden and about 10% of them living in Stockholm municipality (SCB 2016) the total annual value of urban trees in Sweden were estimated to reach approximately 1 300 000 000 SEK.

## 5.3 Arable plants

In terms of amount the production of arable plants was dominated by cereals, with a yearly average harvest of more than 10 million tons. However, in economic terms the value was a little less than that of fodder plants with an average yearly production value of 8.9 billion SEK compared to cereals with an average yearly production value of 7.2 billion SEK (Table 25). Oil plants were produced at a yearly average of approximately 350 thousand tons, to a value of 1 billion SEK.

The production of cereals was dominated by wheat with an almost sevenfold higher amount produced yearly, 7.6 million tons, compared to next most common cereal, barley, which had a yearly average of almost 1.7 million tons. However, the annual production value of wheat and barley were similar, 3.8 and 2.1 billion SEK, respectively. Hence the annual production value of wheat and barley was approximately three times higher than the value of trade out from Sweden of these cereals (Table 20). Oil plants were dominated by rape with an annual mean production of 3.2 thousand tons, which was more than 90 % of the total amount of oil plants produced.

Table 25. Annual mean production of arable plants and production value, during 2012-2016.

Arable plants		Harvest, tons	Area, ha	Value, M SEK
<b>Cereals</b>				<b>7 220.8</b>
<i>Avena sativa</i>	Oats	752 960	176 130	924.4
<i>Hordeum vulgare</i>	Barley	1 685 240	344 718	2 127.6
<i>Secale cereale</i>	Rye	141 260	22 814	175.6
<i>Triticum aestivum</i>	Wheat	7 628 700	409 976	3 757.2
<i>Zea mays</i>	Grain maize	9 860	1 524	
× <i>Triticosecale</i>	Triticale	176 200	31 384	
	Mixed grain	56 200	16 402	
<b>Oil plants</b>				<b>1 054.8</b>
<i>B. rapa</i> ssp. <i>oleifera</i>	Turnip rape	3 220	2 382	
<i>Brassica napus</i> ssp. <i>napus</i>	Rape	318 040	101 382	
<i>Linum usitatissimum</i>	Oil flax	12 740	7 140	
<b>Fodder plants</b>				<b>8 886.0</b>
<i>Zea mays</i>	Green maize	559 100	15 162	
	Ley	4 924 960	870 533	
	Cereals harvested green	458 620	39 210	
	Annual plants harvested green	242 460	16 194	
<b>Other</b>				
<i>Beta vulgaris</i> subsp. <i>vulgaris</i> var. <i>altissima</i>	Beetroot	2 064 900	31 896	492.6
<i>Pisum sativum</i>	Peas	59 640	17 414	95.0
<i>Solanum tuberosum</i>	Potato	819 480	23 942	1 904.4
<i>Vicia faba</i>	Broad bean	76 720	21 756	160.0
Sum				19 813.6

## 5.4 Vegetables

The production of vegetables was comparably rather small in Sweden with a yearly average of less than 1 million ton (Table 26). This was significantly lower than for example arable crops which equaled 30 million tons. The vegetables produced had an annual mean value of 2.2 billion SEK. The economic value was dominated by the production of carrots, with an annual mean value of 527 million SEK, followed by cucumber and tomatoes, with an annual mean value of 262 and 189 million SEK, respectively. The production value of vegetables was approximately seven times higher than the value of trade from Sweden, which was approximately 0.3 billion SEK.

Table 26. Annual mean production of vegetables and economic value, during 2012-2016.

Open field		Harvest, ton	Area, ha	Value, M SEK
<i>Allium cepa</i>	Onion	55 460	1 164	93
<i>Allium porrum</i>	Leek	3 960	133	21
<i>Brassica oleracea</i>	Cabbage	15 680	361	49
<i>Brassica oleracea</i>	Broccoli*	2 733	348	51
<i>Brassica oleracea</i>	Cauliflower	5 800	339	43
<i>Cucumis sativus</i>	Cucumber	9 460	161	32
<i>Daucus carota</i> subsp. <i>Sativus</i>	Carrot	117 540	1 969	527
<i>Lactuca sativa</i>	Lettuce	27 520	1 089	167
	Other lettuce	5 667	600	57
	Other vegetables			254
Greenhouse		Harvest, ton	Area, m <sup>2</sup>	Value, M SEK
<i>Cucumis sativus</i>	Cucumber	29 080	656 820	262
<i>Solanum lycopersicum</i>	Tomato	14 720	386 400	189
		Harvest, k pcs	Area, m <sup>2</sup>	Value, M SEK
	Potted lettuce	14 500	54 020	103
	Garden herbs	43 100	106 520	283
		Harvest, M pcs	Area, m <sup>2</sup>	Value, M SEK
	Other lettuce	4		30
	Other vegetables and berries			35
Sum				2 196

\* Mean value for the time period 2014-2016

## 5.5 Fruit and berries

The production of fruit and berries was lower than the production of vegetables. The annual mean value of produced fruits and berries totalled 777 million SEK (Table 27). Of this total value, more than 60 % was from strawberry production, which was produced at an annual mean value of 484 million SEK. The production value of fruit and berries was almost equal to the value of the same trade from Sweden, which was approximately 600 million SEK annually.

Table 27. Annual mean production of fruit and berries and production values, during 2012-2016.

Open field		Harvest, tons	Area, ha	Value, M SEK
<b>Berries</b>				
<i>Fragaria x ananassa</i>	Strawberry	15 540	2 307	484
<i>Rubus idaeus</i>	Raspberry			53



	Other			19
<b>Fruit</b>				
<i>Malus</i>	Apple	25 500	1 476	189
<i>Prunus</i>	Cherry			9
<i>Prunus</i>	Plum			7
<i>Pyrus</i>	Pear			17
Sum				777

## 5.6 Ornamentals and other berry and open field plants

Ornamental plants and other berry and open field plants were produced at a total annual value equal to that of vegetables, almost 2 billion SEK (Table 28). The most common plants within the group were deciduous trees, 454 million SEK, tulips, 288 million SEK, other potted plants, 191 million SEK, perennials, 166 million SEK, and geraniums, 106 million SEK. The production value of ornamentals and other plants was a hundred times higher than the value of trade from Sweden. This indicate that most of the propagation material that was developed into ornamental- and open field plants etc., were exclusively sold on the Swedish market.

Table 28. Annual mean production of ornamentals and other open field plants and production value, during 2014-2016.

Other ornamental plants		Harvest, M pcs	Value, M SEK
<b>Cut flowers</b>			
<i>Tulipa</i>	Tulips	146.1	287.5
	Other		11.5
<b>Potted bulbs</b>			
<i>Hippeastrum × hortorum</i>	Amaryllis	2.6	62.0
<i>Hyacinthus orientalis</i>	Garden hyacinth	6.8	35.5
<i>Narcissus</i>	Narcissus	5.2	43.0
	Other	1.2	8.8
<b>Potted plants</b>			
<i>Argyranthemum</i>	Marguerite daisy		11.8
<i>Begonia</i>	Begonia		21.3
<i>Cyclamen</i>	Cyclamen		12.0
<i>Euphorbia pulcherrima</i>	Poinsettia		43.9
<i>Kalanchoe</i>	Kalanchoe		15.7
<i>Pelargonium</i>	Geraniums		106.8
<b>Bedding plants</b>			
<i>Lobelia</i>	Lobelia		44.5

<i>Petunia</i>	Petunia		89.1
<i>Tagetes</i>	Tagetes		26.1
<i>Viola tricolor var. Hortensis</i>	Garden pansy		61.8
	Other potted- and bedding plants		191.7
<b>Plant nursery</b>			
	Berry bushes	0.3	12.2
	Broad-leaved trees	0.4	454.0
	Conifers	0.2	16.2
	Fruit trees	0.4	59.4
	Hedge- and landscaping plants	4.5	69.5
	Ornamental shrubs	1.4	54.4
	Perennial plants	10.7	165.7
<i>Rosa</i>	Roses	0.2	16.4
	Strawberry plants	0.9	5.8
	Other		25.1
<b>Sum</b>			
			1 949.3

## 6 Concluding remarks

The trade into Sweden was dominated by different wood products. Moreover, wood and wood products contributed to 87 % of the value of trade from Sweden, and 54 % of the production value of all plants and plant products in Sweden. Hence, the vulnerability to pests related to wood and forests is threefold: it constitutes a large pathway into Sweden, a valuable trade from the country potentially limited in case of serious pest outbreaks, and finally a high domestic production value that may be negatively affected.

The production value of arable crops was also high, however the amount of trade from Sweden and its economic value was lower than that of wood products and forestry. Nevertheless, the effects of serious pests on for example cereals, may be very problematic for the rather large and valuable domestic production.

A little more than 10 % of the forest seedlings, 39 million pieces, were traded into Sweden, a trade that has almost doubled over the last 15 years (Swedish Forest Agency, 2017a). Since living plants in general is an important pathway of entry for many groups of plant pests this may be a source of potential pests for an economically important sector.

Sweden is completely dependent on traded propagation material for vegetables. Thus, even though the amount and value of traded seeds and cuttings for this purpose was low, the dependence on foreign propagation material makes the production rather vulnerable in the case of outbreaks in the main countries traded from, for example Denmark and Germany.

We are aware that the production value, as calculated in this survey, have inherent limitations and comparisons of the value at risk between different types of plants and production systems should be interpreted with caution. For example, the reestablishment of fruit tree orchards, or a forest stand, requires a very high investment. Hence, the economic consequences in the different types of production systems may be higher than the annual production value estimated here. To further develop the estimates of the value at risk, a more detailed modelling of production systems and economy is suggested. For forest systems, this could be done with the forest modelling system Heureka (Wikström et al 2011).

The results in this report are comparable to similar compilations of trade and production data made for Finland (Hannunen et al 2014). For example, the amount of plant materials traded into the two countries were almost identical, 12 million tons on average per year, as was the high proportion of traded goods consisting of wood products. The yearly production value is higher in the Swedish figures, 50 billion SEK in total compared to approximately 30 billion SEK for Finland. This is mirrored both in a somewhat higher forest production as well as a higher production of arable plants in Sweden.

Overall the report provides valuable information for evaluating the risk associated with specific plant pests in Sweden. The survey provides data to enable the identification of potential pathways for plant pests and for the assessment of risk of pest introduction and establishment. Furthermore, the report also provides important information to support estimations of the potential economic impact if a pest becomes established.

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## Appendix 1

Additional information about trade to Sweden. The data in this appendix was obtained from Statistics Sweden (2017). The share of tons by country should be seen as an approximate value.

Table 29. Annual amount of other clover seeds traded into Sweden, by country, in tons and % share, during 2012-2016.

<b>Other clover seeds</b>	<b>Mean</b>	<b>% Mean</b>
Canada	1.4	1%
Czech Republic	2.0	2%
Denmark	32.2	27%
Germany	7.8	7%
Great Britain and Northern Ireland	2.0	2%
New Zealand	64.4	55%
Polen	4.0	3%
Switzerland	3.4	3%
Sum	117.2	100%

Table 30. Annual amount of Italian ryegrass seeds traded into Sweden, by country, in tons and % share, during 2012-2016.

<b>Italian ryegrass seeds</b>	<b>Mean</b>	<b>% Mean</b>
Denmark	20.4	33%
Germany	5.6	9%
Netherlands	4.8	8%
New Zealand	17.4	28%
USA	14.4	23%
Sum	62.6	100%

Table 31. Annual amount of Sweet corn seeds traded into Sweden, by country, in tons and % share,, during 2012-2016.

<b>Sweet corn seeds</b>	<b>Mean</b>	<b>% Mean</b>
France	0.2	2%
Turkey	1.0	12%
USA	7.4	86%
Sum	8.6	100%

Table 32. Annual amount of Beetroot seeds traded into Sweden, by country, in tons and % share,, during 2012-2016.

<b>Beetroot seeds</b>	<b>Mean</b>	<b>% Mean</b>
France	1.4	14%
Germany	0.6	6%
Italy	2.2	22%
USA	5.8	58%
Sum	10.0	100%

Table 33. Annual amount of common bean traded into Sweden, by country, in tons and % share,, during 2012-2016.

<b>Common bean</b>	<b>Mean</b>	<b>% Mean</b>
Bulgaria	0.2	4%
Egypt	0.2	4%
Finland	0.2	4%
Germany	0.6	12%
Italy	0.8	15%
Netherlands	1.6	31%
Thailand	0.2	4%
Turkey	0.6	12%
USA	0.4	8%
Sum	5.2	100%

Table 34. Annual amount of sawn wood of Norway spruce traded into Sweden, by country, in tons and % share,, during 2012-2016.

<b>Sawn wood of Norwegian spruce</b>	<b>Mean</b>	<b>% Mean</b>
Belgium	56	0%
Canada	5	0%
China	7	0%
Denmark	22	0%
Estonia	1 664	1%
Finland	453	0%
France	37	0%
Germany	170	0%
Great Britain and Northern Ireland	10	0%
Latvia	2	0%
Netherlands	12	0%
Norway	107 958	94%
Russia	4 155	4%
<b>Sum</b>	<b>114 551</b>	<b>100%</b>

Table 35. Annual amount of roughly sawn wood of poplar traded into Sweden, by country, in tons and % share, during 2012-2016.

<b>Roughly sawn wood of poplar</b>	<b>Mean</b>	<b>% Mean</b>
Denmark	2.4	10%
Germany	0.8	3%
USA	21	87%
<b>Sum</b>	<b>24.2</b>	<b>100%</b>

Reference:

Statistics Sweden, 2017. URL:

[http://www.statistikdatabasen.scb.se/pxweb/sv/ssd/START\\_\\_HA\\_\\_HA0201\\_\\_HA0201B/ImpTotalKNAr/?rxid=f45f90b6-7345-4877-ba25-9b43e6c6e299](http://www.statistikdatabasen.scb.se/pxweb/sv/ssd/START__HA__HA0201__HA0201B/ImpTotalKNAr/?rxid=f45f90b6-7345-4877-ba25-9b43e6c6e299)