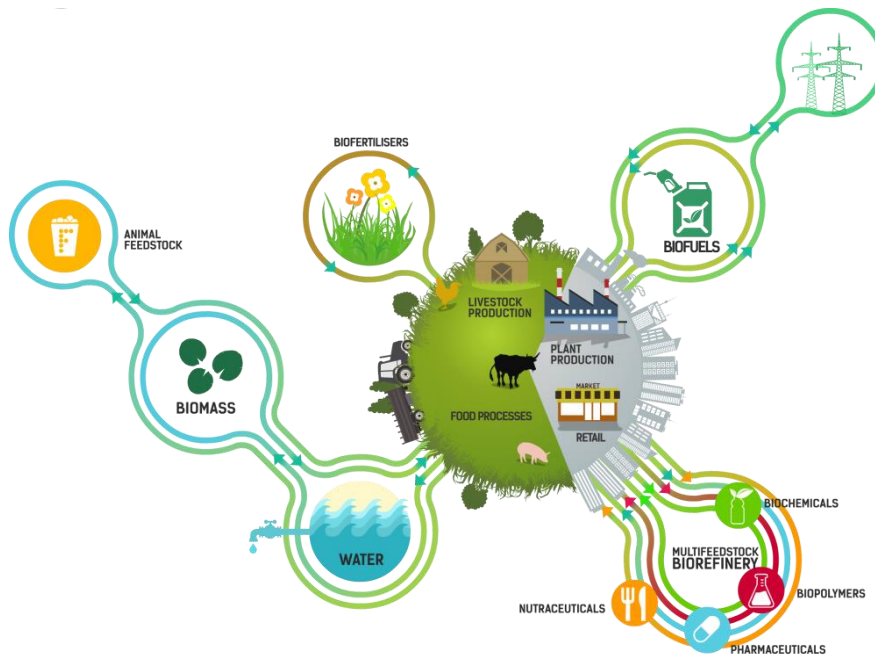


Database/Inventory of the FRUIT AWCB value chain



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1 Introduction

The purpose of this report is to provide a database/inventory of agricultural value chains and the various agricultural wastes, co-products and by-products (AWCB) that are produced along it, including their regional distribution and their current valorisation pathways in EU countries. This is the critical first step to achieving an understanding of the current situation for AWCBs in Europe. The quantities of AWCBs that are produced in the value chain of fruit production will be determined from three main stages: cultivating, processing and consumption.

This report also contains information regarding current practices of AWCB valorisation for analysed commodities as well as consumption data for different commodities per capita. Import and export of different commodities are also included in the report in order to better showcase regional distribution of different commodities consumption and processing.

This study constitutes Deliverable 1.1 of the **Work package 1: Agricultural Waste Value Chain Assessment; Task 1.1 Agricultural value chain mapping** of the European Union's Horizon 2020 research and innovation programme "AGROCYCLE" under grant agreement N^o 690142.

Task 1.1 is viewed as a '**first step**' to map AWCB streams in agricultural production and supply chains across Europe. This first task is vast, encompassing four animal types, seven cereal, five fruit, and ten vegetable value chains. In order to complete the task for the 26 value chains in 28 countries, a wide range of data sources is employed.

The methodology developed for this task acts as a template, to not only illustrate but, to best estimate the quantities of AWCB that are being generated across the various value chains in Europe. This database uses, where possible, the best available data at the time of writing (December 2017). The ultimate success and value of this database depend on the continuous revising with more up to date data it becomes available.

1.1 Project background

Continuing population and consumption growth is driving the demand for food globally, with agricultural activities having to increase to meet this demand. Europe has a major AWCB problem, generating some 700 million tonnes of AWCB annually.

There is an urgent need and huge opportunity to address the efficient use of AWCB towards delivering sustainable value chains in the agriculture and food processing sectors. As such, AgroCycle will convert low-value AWCB into highly valuable products, achieving a 10% increase in waste recycling and valorisation by 2020. This will be achieved by developing a detailed and holistic understanding of the waste streams and piloting a key number of waste utilisation/valorisation pathways. It will bring technologies and systems from ~TRL4 to ~TRL7 within the 3 years of the project. A post-project commercialisation plan will bring commercially promising technologies/systems to TRL8 and TRL9, ensuring AgroCycle will have an enduring impact by achieving sustainable use of AWCB both inside and outside the agricultural sector, leading to the realisation of a Circular Economy.

AgroCycle addresses AWCB from several agricultural sectors: wine, olive oil, horticulture, fruit, grassland, swine, dairy and poultry. The AgroCycle consortium is a large (26) multi-national group (including China) comprising the necessary and relevant multi-actors (i.e. researchers; companies in the technical, manufacturing, advisory, retail sectors (Large and SMEs); lead users; end users; and trade/producer associations) for achieving the project's ambitious goals. Farming's unique regional (rural) location means that AgroCycle will help reduce the EU's Innovation Divide and address the Regional Smart Specialisation Strategies for each partner country: impact will be Regional with National and International dimensions. The presence of three partners from China ensures international synergies and a global impact.

1.2 Scope of this report

The agricultural value chain generates a significant amount of different AWCB types that occur during the three major stages of a complex path, from the field to fork. Figure 1 presents a conceptual model illustrating where AWCB appears.

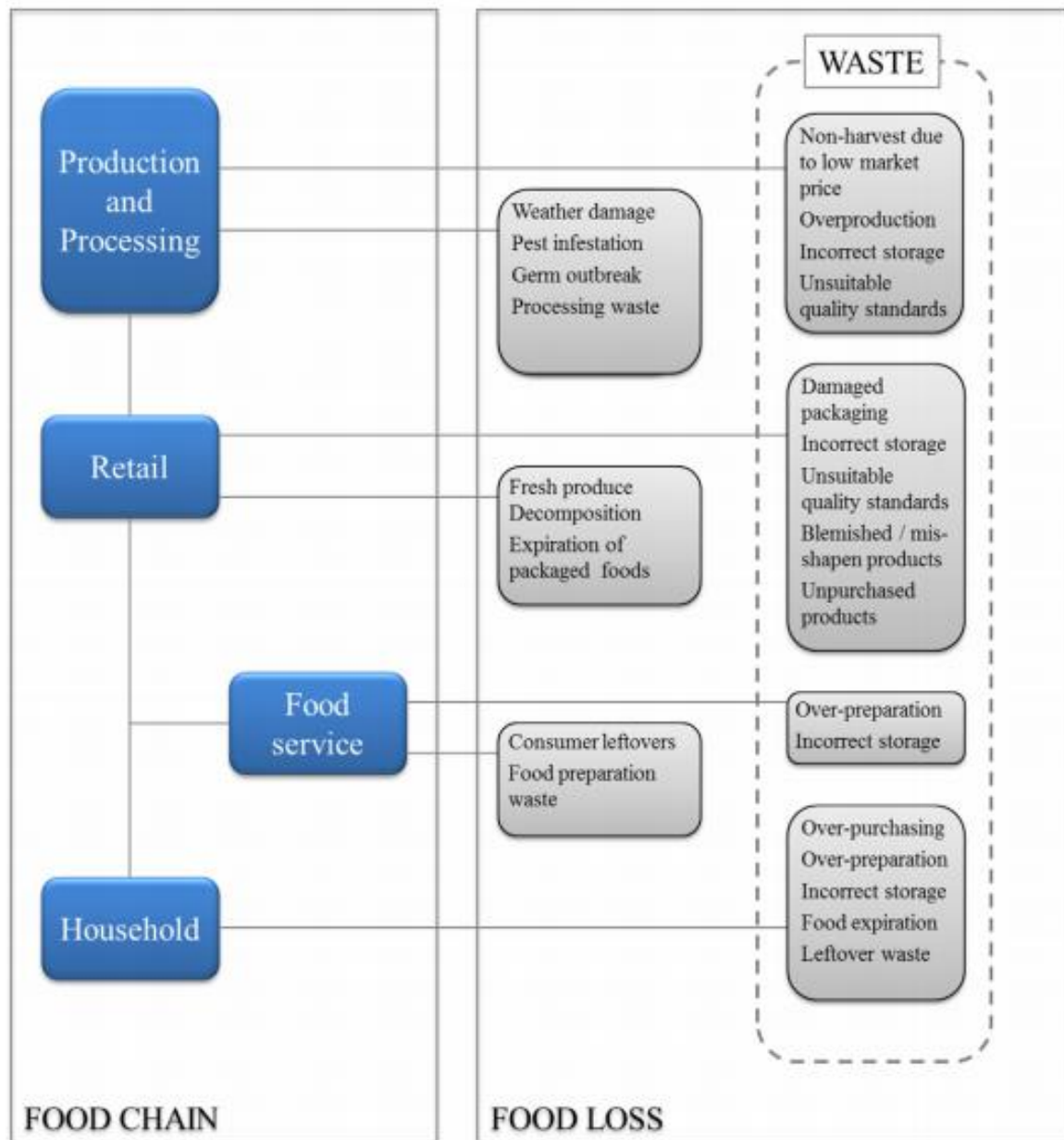


Figure 1 Conceptual model on the food losses generated all along the agri-food chain (1)

Damaged products during harvesting or rotten food in domestic consumption are not necessary “waste” that has to be thrown away. Furthermore, many different types of AWCB

occur during processing stage and for that reason, they should be studied more detailed in order to take proper care of them.

This report presents types, amounts and where AWCB occur along the agri-food value chain, from the field to fork. How AWCB can be valorised is also presented, primarily for the chemical and pharmaceutical industry. Apples, grapes, oranges, peaches and small citrus fruits are types of fruit that are analysed in this report. Each type of fruit is presented, illustrating the AWCB that occurs at each step (with appropriate numerical and graphic data) for every EU-28 country, and pathways to valorise the AWCB. Figure 2 shows steps in AWCB value chain: cultivation, processing and consumption.



Figure 2 Steps in AWCB value chain

Fruit is a crop that is grown as a food for human consumption. During cultivation and harvesting, a certain amount of fruit is eaten or destroyed by animals (birds, rabbits, dears, wasps, etc.), or due to bad weather conditions and in that form cannot be used as food. Furthermore, different diseases, such as Bacterial Leaf Spot, Downey Mildew, Leaf Blotch, Apple Crown Rot, Apple Scab, Bitter Rot, Black Rot, Blister Spot, etc. harm fruits products, stalks and trees that can result either in lower income from the sale of fruit, or in total devastation of plant (2). Key factors in fruit production are: proper site selection, soil type and its quality, water, harvesting technology and in the end market development. Not every type of fruit grows successfully in several positions or different types of soil. When choosing a site for fruit production the slope of the site should be taken into account in order to improve production. The amount of defected fruit due to harvesting and handling errors is an important factor in AWCB calculation. The traditional method of harvesting with harvest workers is slow and its efficiency depends on the skill of the workers. Modern methods with appropriate machinery are useful in great agriculture areas where a large amount of fruit is being produced. Modern methods of harvesting are more expensive than traditional and depending on the quality of machine it can vary in harvesting losses (3). Thus the amount of AWCB produced during production stage can vary greatly dependant on a large number of factors discussed above.

Fruit intended for processing will result in different products depending on type and purpose of the process. All analysed fruits can be used in the preparation of juice, whether concentrated or not. Furthermore, apples can be used for vinegar production, whilst citrus fruits are commonly used for food additives production, such as aroma.

The AWCB produced in the consumption stage of the value chain is mainly the result of human behaviour. The main reasons for throwing away food that could be eaten are: leftovers from a meal, looked or tasted bad, went mouldy, leftovers after cooking (4). Research has quantified that the average person in the UK throws away around 70kg of avoidable 'wasted' food a year. Many of these rotten food products can become a feedstock for energy production, i.e. if they are valorised through anaerobic digestion to produce biogas.

2 Method and commodities

This section gives a review of how and where the different AWCB occurs for given fruits. For each fruit, there is a short description of AWCB.

For all the types of fruits presented in the following tables, calculations are carried out for every country of the EU28 country, according to data collected from EUROSTAT for the period 2010-2015. Import and export data is collected from FAOSTAT for the available period. Consumption per capita of fresh (raw) fruits at a domestic level are given in appropriate tables at the end of the review. A key assumption is that quantity of consumed food does not change in the given period of time. The list below shows the notation of specific values needed for calculation of fruit that can be eatable (cooked or raw) and their relations:

PRD = PRODUCTION OF FRUIT IN COUNTRY (tonnes) **(I)**

CON = CONSUMPTION OF RAW FRUIT (tonnes) **(II)**

IMP = IMPORTED QUANTITY OF FRUIT (tonnes) **(III)**

EXP = EXPORTED QUANTITY OF FRUIT (tonnes) **(IV)**

PRC = QUANTITY OF PROCESSED FRUIT (tonnes) **(V)**

PC = CONSUMPTION OF FRUIT PER CAPITA PER YEAR (kg) **(VI)**

CON = POP x PC **(VII)**

PRC = (PRD+IMP) - (CON+EXP) **(VIII)**

By using specific consumption data for every country and population for every year, a calculation of consumed food for the period 2010-2015 is carried out. Table 1 shows the population of EU-28 countries in the period 2010-2015 taken from (5).

Fresh (raw) consumption data is critical to this analysis, as it ultimately determines the quantities of commodities that are processed. EUROSTAT and FAOSTAT databases provide regular and consistent data on fresh production and trade (import/export) of vegetables on an annual basis in all European countries. Unfortunately, fresh consumption figures are more difficult to determine and limited reliable data is available from reputable sources

It was found that data on fruit consumption from some sources incorporated both fresh and processed consumption (in kg/capita/year). Using these values to represent fresh consumption would result in negative processing figures. Due to the lack of published data on fresh consumption, average values and best estimates are employed for each commodity from reputable sources.

In order to present the type and mass of AWCB for each step of the fruit value chain, Table 2 contains data for five analysed fruit: apples, grapes, oranges, peaches and small citrus fruits. In the cultivation step, the main AWCB that occurs for every fruit is pruning residues. The processing step differs for every fruit, as does the AWCB that is generated. The AWCB generated in the processing step has a different application, due to chemical composition and properties. At the consumption stage, the main AWCB is non-edible rotten fruit. That is the result of inappropriate storage of fruit and consumption habits of people.

EUROSTAT provides data for harvested fruits (raw). The quantity of AWCB is expressed in a mass ratio of AWCB to the quantity of fruit used in that step. For example, 0.10 kg of pruning residue and leaves appear when 1 kg of apples are harvested.

Table 1 Population of EU-28 countries (5)

GEO/ POPULATION	2010	2011	2012	2013	2014	2015
Belgium	10,839,905	11,000,638	11,094,850	11,161,642	11,180,840	11,237,274
Bulgaria	7,421,766	7,369,431	7,327,224	7,284,552	7,245,677	7,202,198
Czech Republic	10,462,088	10,486,731	10,505,445	10,516,125	10,512,419	10,538,275
Denmark	5,534,738	5,560,628	5,580,516	5,602,628	5,627,235	5,659,715
Germany	81,802,257	80,222,065	80,327,900	80,523,746	80,767,463	81,197,537
Estonia	1,333,290	1,329,660	1,325,217	1,320,174	1,315,819	1,314,870
Ireland	4,549,428	4,570,881	4,582,707	4,591,087	4,605,501	4,628,949
Greece	11,119,289	11,123,392	11,086,406	11,003,615	10,926,807	10,858,018
Spain	46,486,619	46,667,174	46,818,219	46,727,890	46,512,199	46,449,565
France	64,658,856	64,978,721	65,276,983	65,600,350	65,942,093	66,488,186
Croatia	4,302,847	4,289,857	4,275,984	4,262,140	4,246,809	4,225,316
Italy	59,190,143	59,364,690	59,394,207	59,685,227	60,782,668	60,795,612
Cyprus	819,140	839,751	862,011	865,878	858,000	847,008
Latvia	2,120,504	2,074,605	2,044,813	2,023,825	2,001,468	1,986,096
Lithuania	3,141,976	3,052,588	3,003,641	2,971,905	2,943,472	2,921,262
Luxembourg	502,066	511,840	524,853	537,039	549,680	562,958
Hungary	10,014,324	9,985,722	9,931,925	9,908,798	9,877,365	9,855,571
Malta	414,027	414,989	417,546	421,364	425,384	429,344
Netherlands	16,574,989	16,655,799	16,730,348	16,779,575	16,829,289	16,900,726
Austria	8,351,643	8,375,164	8,408,121	8,451,860	8,506,889	8,576,261
Poland	38,022,869	38,062,718	38,063,792	38,062,535	38,017,856	38,005,614
Portugal	10,573,479	10,572,721	10,542,398	10,487,289	10,427,301	10,374,822
Romania	20,294,683	20,199,059	20,095,996	20,020,074	19,947,311	19,870,647
Slovenia	2,046,976	2,050,189	2,055,496	2,058,821	2,061,085	2,062,874
Slovakia	5,390,410	5,392,446	5,404,322	5,410,836	5,415,949	5,421,349
Finland	5,351,427	5,375,276	5,401,267	5,426,674	5,451,270	5,471,753
Sweden	9,340,682	9,415,570	9,482,855	9,555,893	9,644,864	9,747,355
United Kingdom	62,510,197	63,022,532	63,495,303	63,905,297	64,351,155	64,875,165

Table 2 Main AWCB produced from fruit sector

Fruit	Cultivation		Processing	Consumption		
Apple	Pruning residues and leaves to product ratio: 0.10 kg / kg	(6)	Pomace (peel, core, seed, calyx, stem) to product ratio: 0.25 kg / kg	(7)	Rotten apples to product ratio 0.19 kg / kg	(8)
			Sludge to product ratio: 0.10 kg / kg	(7)		
Grape	Stalks to product ratio: 0.055 kg / kg <hr/> Pruning residues and leaves to product ratio: 0.30 kg / kg	(9)	Marc waste (skin, pulp, seed and stems) to product ratio: 0.22 kg / kg	(9)	Rotten grapes to product ratio 0.19 kg / kg	(8)
			CO ₂ to product ratio: 0.07 kg / kg	(9)		
			Lees to product ratio: 0.03 kg / kg	(9)		
Orange	Pruning residues and leaves to product ratio: 0.085 kg / kg	(10)	Orange pomace to product ratio: 0.37-0.60 kg / kg	(11), (12), (13), (14)	Rotten oranges to product ratio 0.19 kg / kg	(8)
			Liquid of waste ("yellow water") to product ratio: 0.005 kg / kg	(15)		
Peach	Pruning residues and leaves to product ratio: 0.12 kg / kg	(16)	Processing water to product ratio 11.9 L / kg	(15)	Rotten peaches to product ratio 0.19 kg / kg	(8)
			Peach kernel to product ratio: 0.04 – 0.11 kg / kg	(17), (18), (19)		
			Peach pomace to product ratio: 0.30 kg / kg	(17)		
Small citrus fruit	Pruning residues and leaves to product ratio: 0.065 kg / kg	(16)	Small citrus fruit pomace to product ratio: 0.5 kg / kg	(20), (21)	Rotten small citrus fruits to product ratio 0.19 kg / kg	(8)
			Liquid waste to product ratio: 0.005 kg / kg	(15)		

2.1 Apple

An apple is one of the most consumed fruit in the world (22). There are 7,500 varieties of apples grown throughout the world, although not all varieties are adopted due to climate conditions (23). Apples are grown throughout the whole of Europe. The greatest quantities of AWCB are pruning residues, shown in Figure 3 (24). Pruning residues are typically burnt.



Figure 3 Apple pruning residues (24)

The apple processing stage is complex due to a variety of products that can be made from apples. Apples can be used for the production of juice, cider, cookies, vinegar, etc. (25). Pomace is the main AWCB that occurs in this step and consists of peel, core, seed, calyx and stem. Apple pomace occurs when apples are crushed and pressed to take out the valuable juice. Figure 4 shows apple pomace in a cider factory (26).



Figure 4 Apple pomace from cider factory (26)

Flowchart (Figure 5) presents the value chain for apple and specific AWCB weight factors from Table 2.

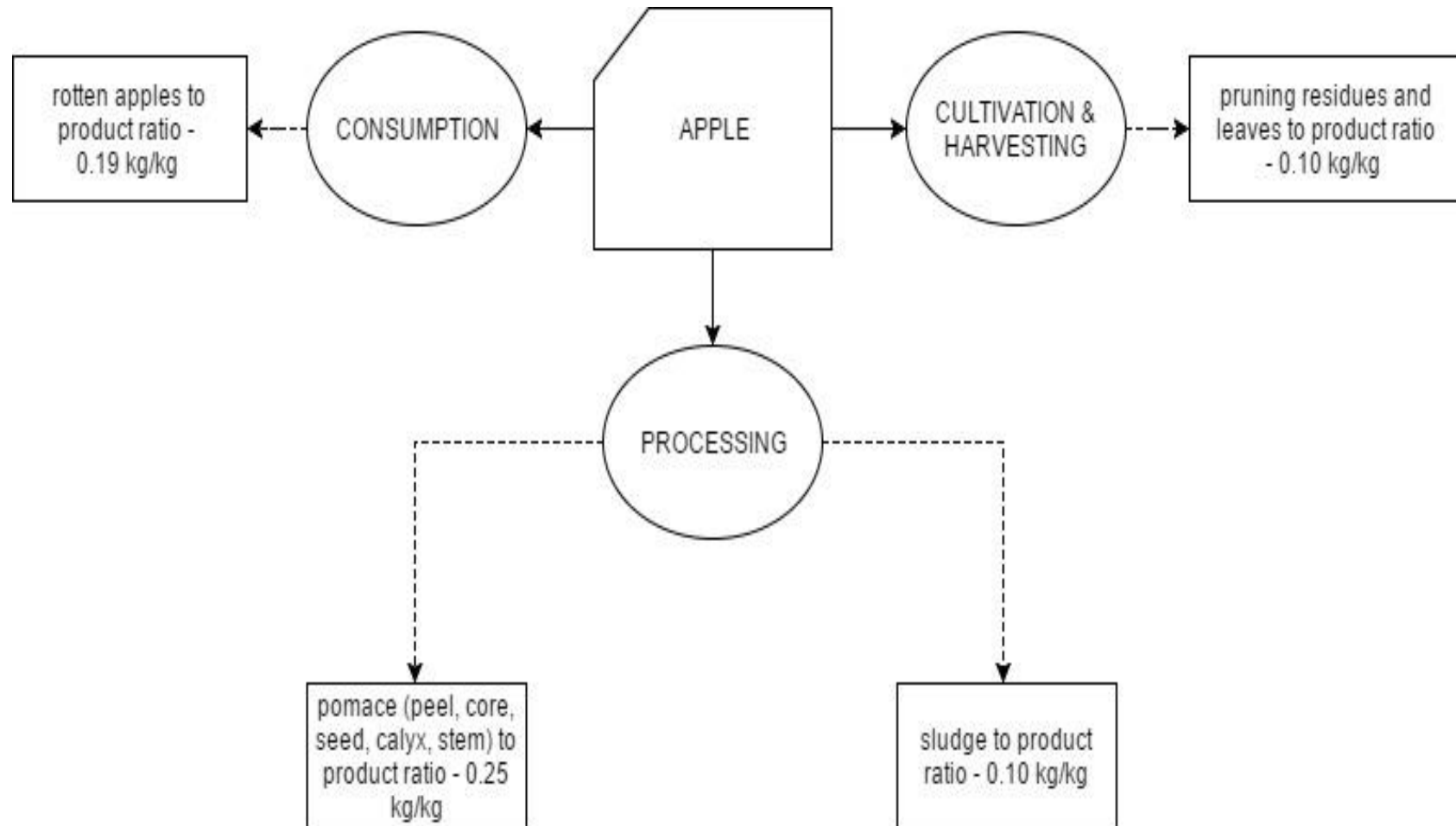


Figure 5 Apple AWCB value chain

Data for cultivated apples are taken from EUROSTAT, and data for imported and exported apples is taken from FAOSTAT. From specific consumption of apples and population in the country, amount of consumed apples is calculated. By using relation (I-VIII), the quantity of processed apples is calculated for every country in each given year. The quantity of AWCB is then calculated for every step and every year. Below is an example of the calculation for Germany in 2010:

PRD = 834,960 tonnes

IMP = 621,502 tonnes

EXP = 101,921 tonnes

CON = 1,188,587 tonnes

PRC = $(834,960 + 621,502) - (101,921 + 948,906)$ tonnes = 405,635 tonnes

The quantity of pruning residues is 0.10 kg per kg of harvested apples: for Germany, it was 83,496 tonnes in 2010. Apple pomace that occurs in processing step takes 0.25 kg per kg of processed apples: for Germany, the quantity of apple pomace was 101,409 tonnes in 2010. The quantity of consumed apples in Germany was 948,906 tonnes in 2010, of this amount 19% was calculated to go mouldy (spoiled, rotten) or 180,292 tonnes. Results for other countries and years are presented in the tables and figures below.

Table 3 Tonnes of harvested apples per country, 2010-2015 (27)

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	343,980	228,410	220,380	228,920	318,440	284,210	220,380	343,980	270,723
Bulgaria	43,200	40,400	30,940	55,010	54,500	58,420	30,940	58,420	47,078
Czech Republic	99,800	84,590	118,710	121,800	128,290	155,360	84,590	155,360	118,092
Denmark	24,190	26,510	18,730	31,180	35,370	35,650	18,730	35,650	28,605
Germany	834,960	898,450	972,410	803,780	1,115,900	973,460	803,780	1,115,900	933,160
Estonia	800	1,200	1,000	2,400	1,200	1,600	800	2,400	1,367
Ireland	21,060	20,440	12,100	15,220	19,620	18,790	12,100	21,060	17,872
Greece	239,100	255,800	251,030	282,190	280,500	281,750	239,100	282,190	265,062
Spain	646,260	670,280	481,520	545,980	620,820	598,210	481,520	670,280	593,845
France	2,057,590	2,113,330	1,574,340	2,037,780	1,847,550	1,967,140	1,574,340	2,113,330	1,932,955
Croatia	89,120	99,680	37,410	107,010	96,700	96,180	37,410	107,010	87,683
Italy	2,204,970	2,411,200	2,048,900	2,216,960	2,473,610	2,441,580	2,048,900	2,473,610	2,299,537
Cyprus	6,950	7,120	6,840	5,310	4,850	4,880	4,850	7,120	5,992
Latvia	10,300	7,500	9,400	14,800	9,600	7,800	7,500	14,800	9,900
Lithuania	29,200	43,500	63,800	56,400	52,000	64,980	29,200	64,980	51,647
Luxembourg	2,650	2,130	1,820	1,930	2,620	2,420	1,820	2,650	2,262
Hungary	496,920	292,810	650,600	591,870	779,850	500,000	292,810	779,850	552,008
Malta	50	40	30	40	40	30	30	50	38
Netherlands	340,000	418,000	281,000	314,000	353,000	335,900	281,000	418,000	340,317
Austria	270,810	302,810	262,110	234,590	310,340	287,600	234,590	310,340	278,043
Poland	1,877,900	2,493,100	2,877,300	3,085,100	3,195,300	3,168,800	1,877,900	3,195,300	2,782,917
Portugal	212,900	247,230	220,760	287,310	273,720	324,990	212,900	324,990	261,152
Romania	543,780	611,250	453,780	502,950	502,440	459,050	453,780	611,250	512,208
Slovenia	77,290	81,320	55,340	69,570	71,030	83,860	55,340	83,860	73,068
Slovakia	34,170	31,360	44,670	45,950	48,490	46,250	31,360	48,490	41,815
Finland	4,260	5,250	4,810	4,810	5,340	6,030	4,260	6,030	5,083
Sweden	23,470	20,670	23,390	27,420	24,580	25,350	20,670	27,420	24,147
United Kingdom	358,800	430,000	375,000	385,500	268,000	459,600	268,000	459,600	379,483

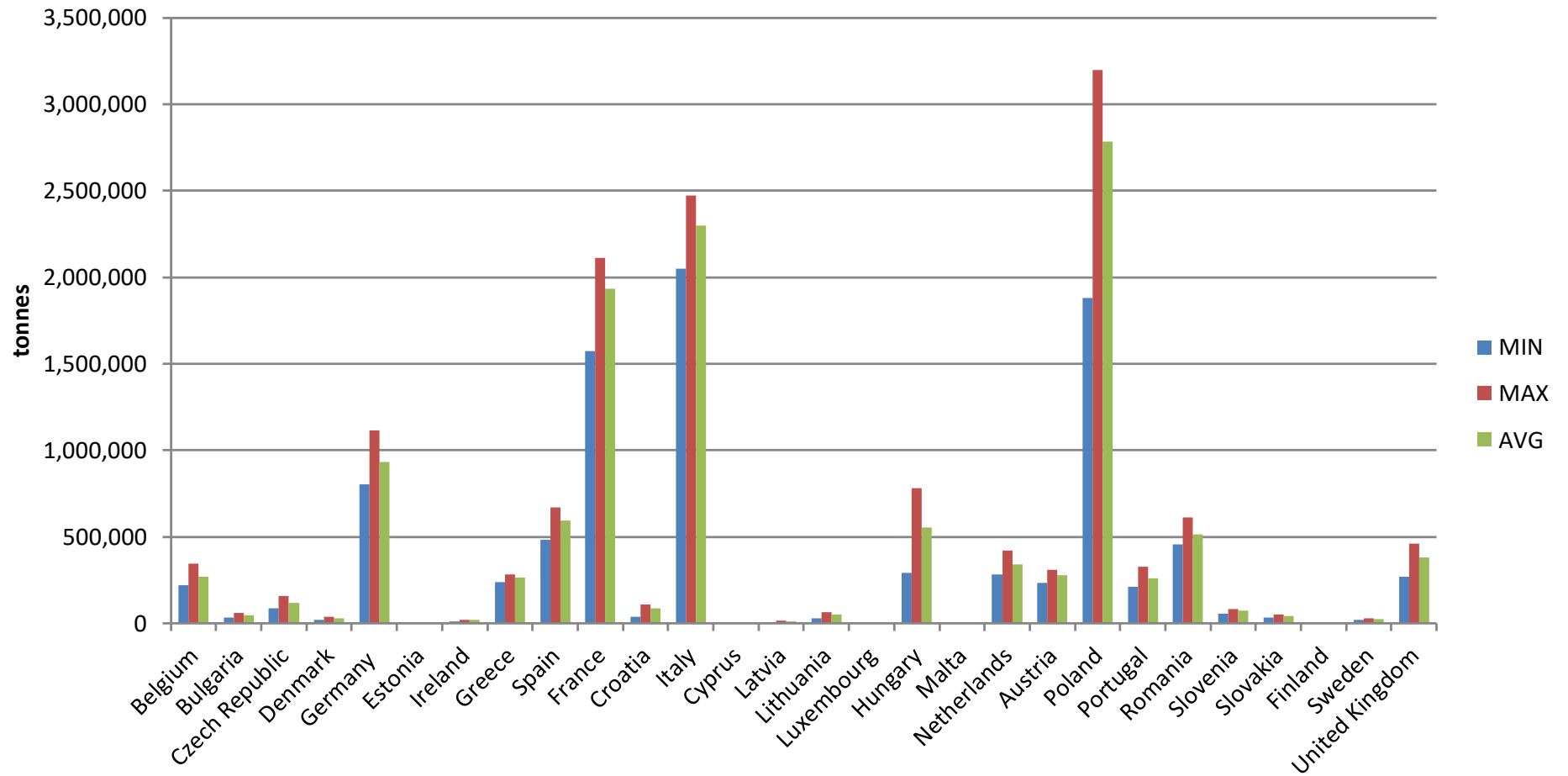


Figure 6 Tonnes of harvested apples per country, 2010-2015

Table 4 Tonnes of apple pruning residues and leaves per country, 2010-2015

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	34,398	22,841	22,038	22,892	31,844	28,421	22,038	34,398	27,072
Bulgaria	4,320	4,040	3,094	5,501	5,450	5,842	3,094	5,842	4,708
Czech Republic	9,980	8,459	11,871	12,180	12,829	15,536	8,459	15,536	11,809
Denmark	2,419	2,651	1,873	3,118	3,537	3,565	1,873	3,565	2,861
Germany	83,496	89,845	97,241	80,378	111,590	97,346	80,378	111,590	93,316
Estonia	80	120	100	240	120	160	80	240	137
Ireland	2,106	2,044	1,210	1,522	1,962	1,879	1,210	2,106	1,787
Greece	23,910	25,580	25,103	28,219	28,050	28,175	23,910	28,219	26,506
Spain	64,626	67,028	48,152	54,598	62,082	59,821	48,152	67,028	59,385
France	205,759	211,333	157,434	203,778	184,755	196,714	157,434	211,333	193,296
Croatia	8,912	9,968	3,741	10,701	9,670	9,618	3,741	10,701	8,768
Italy	220,497	241,120	204,890	221,696	247,361	244,158	204,890	247,361	229,954
Cyprus	695	712	684	531	485	488	485	712	599
Latvia	1,030	750	940	1,480	960	780	750	1,480	990
Lithuania	2,920	4,350	6,380	5,640	5,200	6,498	2,920	6,498	5,165
Luxembourg	265	213	182	193	262	242	182	265	226
Hungary	49,692	29,281	65,060	59,187	77,985	50,000	29,281	77,985	55,201
Malta	5	4	3	4	4	3	3	5	4
Netherlands	34,000	41,800	28,100	31,400	35,300	33,590	28,100	41,800	34,032
Austria	27,081	30,281	26,211	23,459	31,034	28,760	23,459	31,034	27,804
Poland	187,790	249,310	287,730	308,510	319,530	316,880	187,790	319,530	278,292
Portugal	21,290	24,723	22,076	28,731	27,372	32,499	21,290	32,499	26,115
Romania	54,378	61,125	45,378	50,295	50,244	45,905	45,378	61,125	51,221
Slovenia	7,729	8,132	5,534	6,957	7,103	8,386	5,534	8,386	7,307
Slovakia	3,417	3,136	4,467	4,595	4,849	4,625	3,136	4,849	4,182
Finland	426	525	481	481	534	603	426	603	508
Sweden	2,347	2,067	2,339	2,742	2,458	2,535	2,067	2,742	2,415
United Kingdom	35,880	43,000	37,500	38,550	26,800	45,960	26,800	45,960	37,948

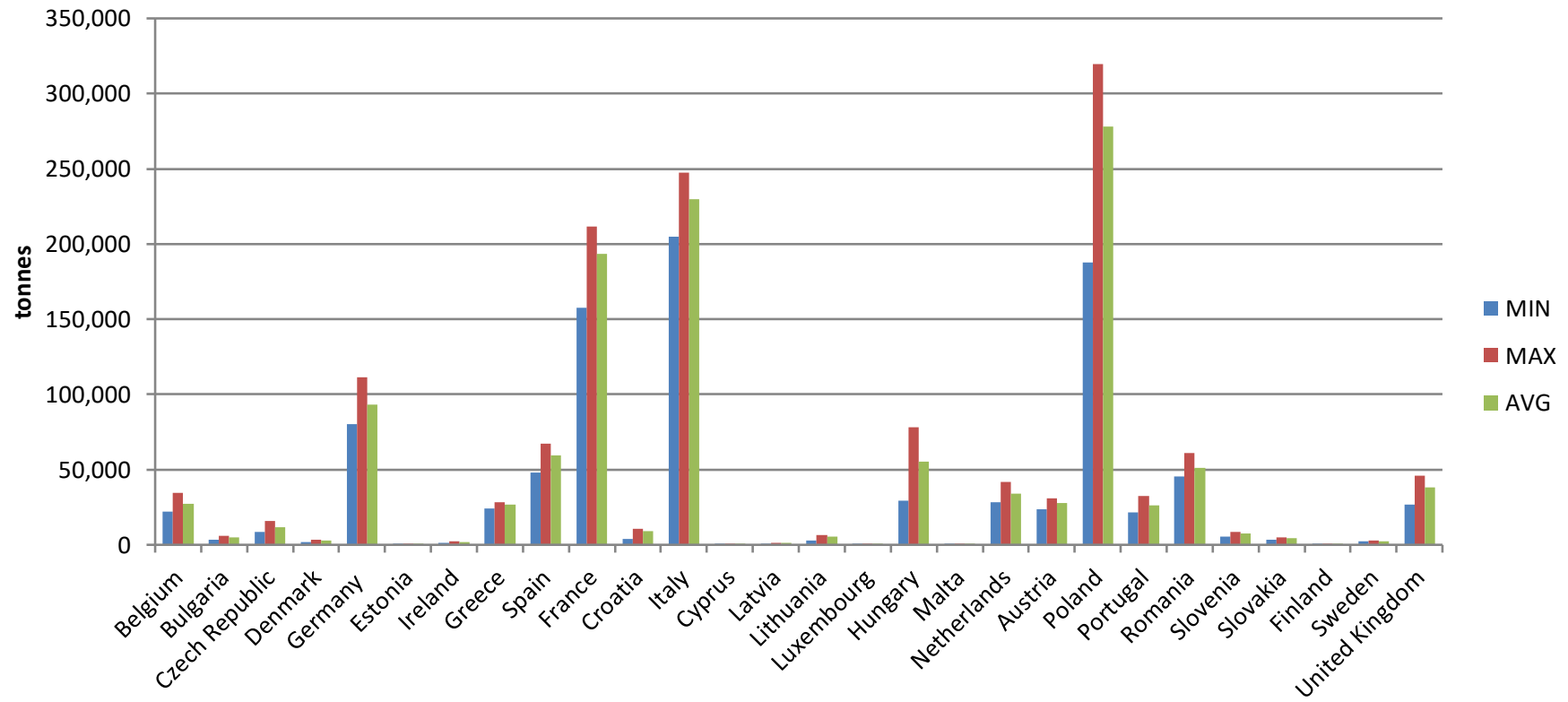


Figure 7 Tonnes of pruning residues and leaves

Table 5 Tonnes of imported and exported apples per country, 2010-2013 (28)

GEO/POPULATION	Trade	2010	2011	2012	2013
Belgium	Import	146,035	166,053	155,406	160,491
	Export	245,806	269,144	180,879	202,206
Bulgaria	Import	28,343	22,281	31,740	31,492
	Export	1,876	4,029	959	445
Czech Republic	Import	71,034	71,083	83,105	77,995
	Export	47,535	33,900	111,347	60,370
Denmark	Import	77,248	77,392	66,041	57,653
	Export	2,833	3,735	5,142	4,877
Germany	Import	621,502	665,662	614,362	658,442
	Export	101,921	102,782	136,310	95,218
Estonia	Import	12,419	11,538	12,161	10,158
	Export	621	350	40	21
Ireland	Import	53,208	53,768	52,350	51,284
	Export	4,175	4,353	5,929	5,277
Greece	Import	18,205	22,705	16,637	12,975
	Export	42,616	37,641	46,731	54,502
Spain	Import	253,496	253,056	231,378	240,068
	Export	121,327	143,690	141,757	112,870
France	Import	170,464	137,770	206,688	239,386
	Export	695,760	726,609	626,319	543,164
Croatia	Import	8,839	10,889	13,796	20,417
	Export	19,599	18,282	7,063	12,595
Italy	Import	41,324	37,013	37,315	46,661
	Export	856,598	976,131	933,367	788,021
Cyprus	Import	6,757	7,512	6,579	6,055
	Export	0	0	5	3
Latvia	Import	12,355	14,478	18,446	14,847
	Export	1,882	6,602	6,126	8,852
Lithuania	Import	51,481	52,515	68,223	61,039
	Export	43,095	63,025	73,443	65,028
Luxembourg	Import	6,078	5,388	5,865	5,745
	Export	342	318	354	424
Hungary	Import	36,708	85,042	23,962	21,961
	Export	20,495	22,596	32,787	40,232
Malta	Import	3,443	4,588	3,748	3,545
	Export	242	0	0	0
Netherlands	Import	324,406	310,635	311,095	330,991
	Export	352,844	341,296	283,656	273,033
Austria	Import	73,375	95,697	111,483	118,319
	Export	104,577	110,664	114,958	85,710
Poland	Import	39,630	61,898	51,450	41,998
	Export	728,500	532,058	958,364	1,205,248
Portugal	Import	56,043	57,494	53,051	57,781
	Export	8,985	20,486	22,198	23,968
Romania	Import	36,981	42,724	59,790	62,785
	Export	27,772	45,916	13,984	19,431
Slovenia	Import	19,627	18,414	26,194	28,956
	Export	36,732	43,203	36,407	35,012
Slovakia	Import	53,745	49,855	43,037	34,546
	Export	16,727	16,036	16,892	21,309
Finland	Import	47,821	49,441	45,778	44,576
	Export	20	72	214	141
Sweden	Import	84,414	91,151	96,449	93,175
	Export	1,499	694	1,046	2,552
United Kingdom	Import	460,722	459,068	482,049	479,667
	Export	19,497	30,179	21,182	21,555

Table 6 Tonnes of processed apples per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	34,402	35,664	14,895	18,966	14,895	35,664	25,982
Germany	405,635	530,754	518,658	432,929	405,635	530,754	471,994
Estonia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	17,320	16,833	5,362	7,970	5,362	17,320	11,871
Greece	85,705	111,833	92,334	113,021	85,705	113,021	100,723
Spain	239,184	238,307	28,050	131,134	28,050	239,184	159,169
France	782,251	770,738	397,496	973,038	397,496	973,038	730,881
Croatia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy	703,090	783,452	463,875	783,251	463,875	783,452	683,417
Cyprus	4,205	4,891	3,415	1,318	1,318	4,891	3,457
Latvia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lithuania	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Luxembourg	2,562	1,263	1,243	1,021	1,021	2,562	1,522
Hungary	396,967	239,422	526,565	458,657	239,422	526,565	405,403
Malta	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	119,292	194,132	114,367	177,315	114,367	194,132	151,276
Austria	142,729	190,691	161,101	169,157	142,729	190,691	165,920
Poland	747,965	1,581,412	1,528,846	1,480,325	747,965	1,581,412	1,334,637
Portugal	137,306	161,594	129,321	199,470	129,321	199,470	156,923
Romania	317,571	373,749	266,472	314,071	266,472	373,749	317,966
Slovenia	36,440	32,749	21,283	39,632	21,283	39,632	32,526
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sweden	N/A	N/A	N/A	N/A	N/A	N/A	N/A
United Kingdom	74,907	127,828	99,321	102,311	74,907	127,828	101,092

Note: N/A is included as the assumed consumption data used in this calculation results in a negative processing amount and, therefore cannot be used.

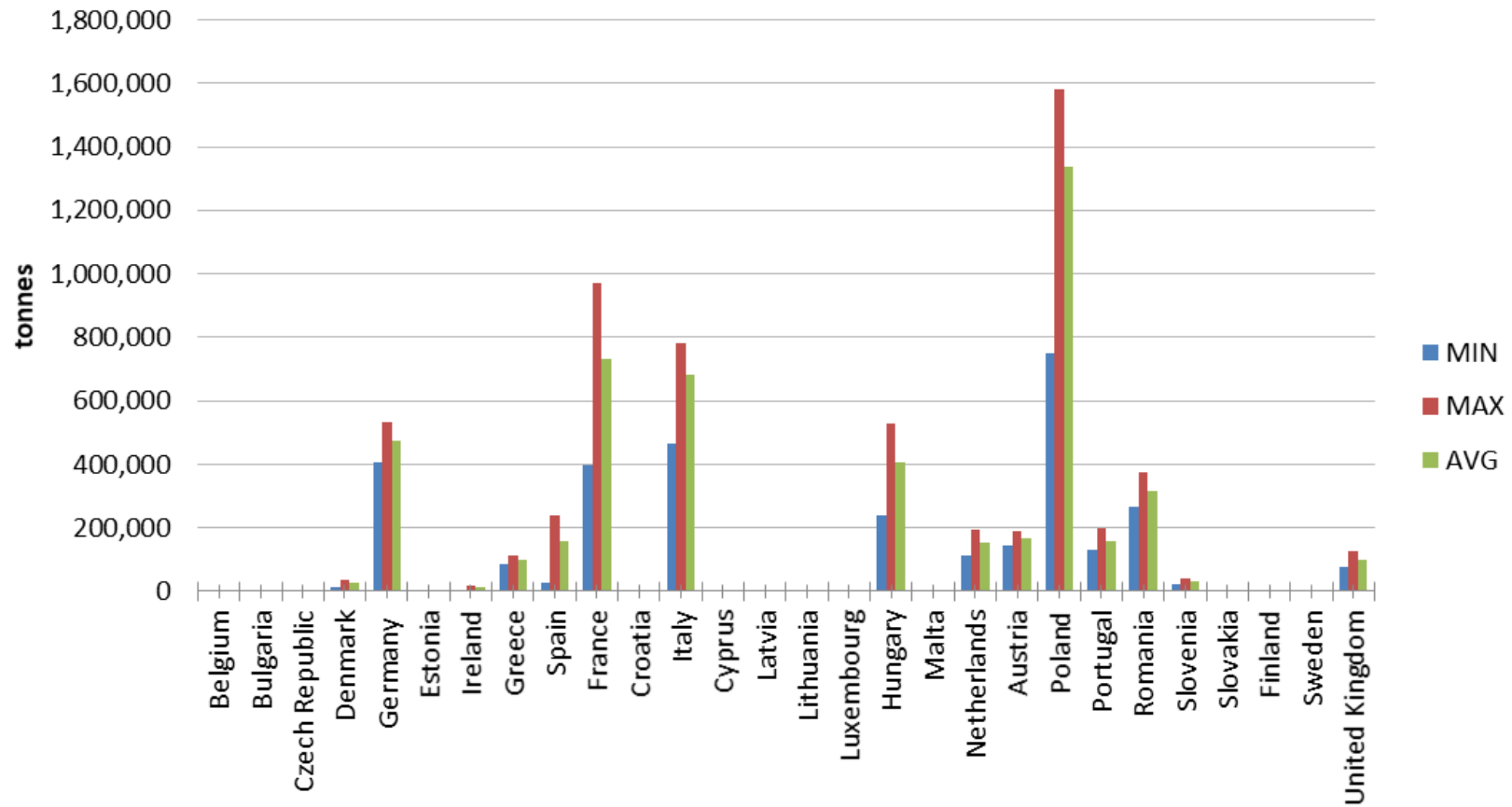


Figure 8 Tonnes of processed apples per country, 2010-2013

Table 7 Tonnes of apple pomace per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	8,601	8,916	3,724	4,741	3,724	8,916	6,495
Germany	101,409	132,689	129,665	108,232	101,409	132,689	117,998
Estonia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	4,330	4,208	1,340	1,993	1,340	4,330	2,968
Greece	21,426	27,958	23,083	28,255	21,426	28,255	25,181
Spain	59,796	59,577	7,012	32,784	7,012	59,796	39,792
France	195,563	192,684	99,374	243,259	99,374	243,259	182,720
Croatia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy	175,773	195,863	115,969	195,813	115,969	195,863	170,854
Cyprus	1,051	1,223	854	329	329	1,223	864
Latvia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lithuania	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Luxembourg	641	316	311	255	255	641	381
Hungary	99,242	59,855	131,641	114,664	59,855	131,641	101,351
Malta	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	29,823	48,533	28,592	44,329	28,592	48,533	37,819
Austria	35,682	47,673	40,275	42,289	35,682	47,673	41,480
Poland	186,991	395,353	382,212	370,081	186,991	395,353	333,659
Portugal	34,326	40,399	32,330	49,868	32,330	49,868	39,231
Romania	79,393	93,437	66,618	78,518	66,618	93,437	79,491
Slovenia	9,110	8,187	5,321	9,908	5,321	9,908	8,131
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sweden	N/A	N/A	N/A	N/A	N/A	N/A	N/A
United Kingdom	18,727	31,957	24,830	25,578	18,727	31,957	25,273

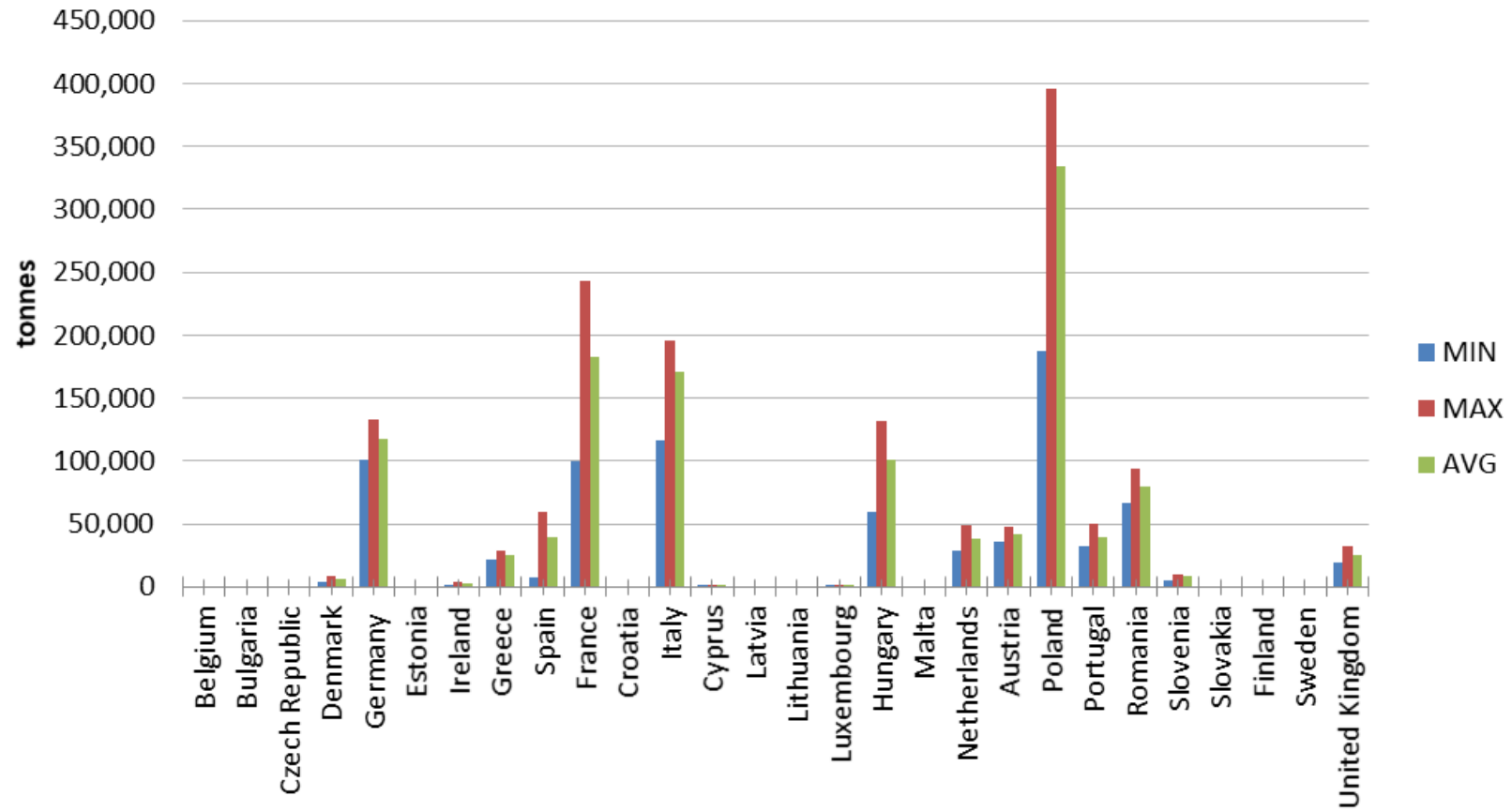


Figure 9 Tonnes of apple pomace per country, 2010-2013

Table 8 Tonnes of apple sludge per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	3,440	3,566	1,490	1,897	1,490	3,566	2,598
Germany	40,563	53,075	51,866	43,293	40,563	53,075	47,199
Estonia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	1,732	1,683	536	797	536	1,732	1,187
Greece	8,571	11,183	9,233	11,302	8,571	11,302	10,072
Spain	23,918	23,831	2,805	13,113	2,805	23,918	15,917
France	78,225	77,074	39,750	97,304	39,750	97,304	73,088
Croatia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy	70,309	78,345	46,388	78,325	46,388	78,345	68,342
Cyprus	420	489	341	132	132	489	346
Latvia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lithuania	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Luxembourg	256	126	124	102	102	256	152
Hungary	39,697	23,942	52,656	45,866	23,942	52,656	40,540
Malta	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	11,929	19,413	11,437	17,731	11,437	19,413	15,128
Austria	14,273	19,069	16,110	16,916	14,273	19,069	16,592
Poland	74,796	158,141	152,885	148,032	74,796	158,141	133,464
Portugal	13,731	16,159	12,932	19,947	12,932	19,947	15,692
Romania	31,757	37,375	26,647	31,407	26,647	37,375	31,797
Slovenia	3,644	3,275	2,128	3,963	2,128	3,963	3,253
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sweden	N/A	N/A	N/A	N/A	N/A	N/A	N/A
United Kingdom	7,491	12,783	9,932	10,231	7,491	12,783	10,109

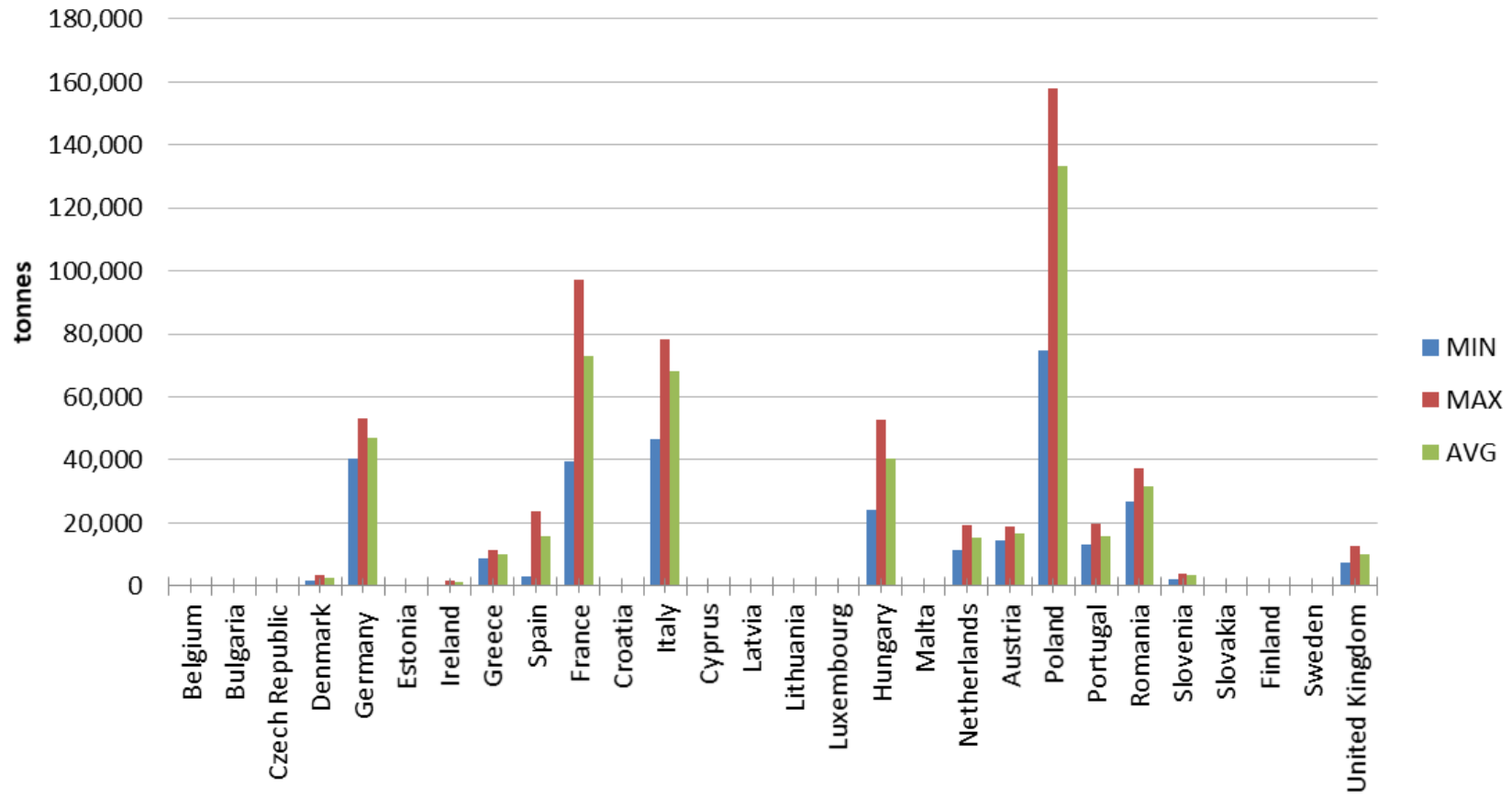


Figure 10 Tonnes of apple sludge per country, 2010-2013

Table 9 Consumption of fresh apples (tonnes) per country, 2010-2015

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	64,203	64,503	64,734	64,990	65,276	65,653	64,203	65,653	64,893
Germany	948,906	930,576	931,804	934,075	936,903	941,891	930,576	948,906	937,359
Estonia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	52,773	53,022	53,159	53,257	53,424	53,696	52,773	53,696	53,222
Greece	128,984	129,031	128,602	127,642	126,751	125,953	125,953	129,031	127,827
Spain	539,245	541,339	543,091	542,044	539,542	538,815	538,815	543,091	540,679
France	750,043	753,753	757,213	760,964	764,928	771,263	750,043	771,263	759,694
Croatia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy	686,606	688,630	688,973	692,349	705,079	705,229	686,606	705,229	694,478
Cyprus	9,502	9,741	9,999	10,044	9,953	9,825	9,502	10,044	9,844
Latvia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lithuania	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Luxembourg	5,824	5,937	6,088	6,230	6,376	6,530	5,824	6,530	6,164
Hungary	116,166	115,834	115,210	114,942	114,577	114,325	114,325	116,166	115,176
Malta	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	192,270	193,207	194,072	194,643	195,220	196,048	192,270	196,048	194,243
Austria	96,879	97,152	97,534	98,042	98,680	99,485	96,879	99,485	97,962
Poland	441,065	441,528	441,540	441,525	441,007	440,865	440,865	441,540	441,255
Portugal	122,652	122,644	122,292	121,653	120,957	120,348	120,348	122,652	121,757
Romania	235,418	234,309	233,114	232,233	231,389	230,500	230,500	235,418	232,827
Slovenia	23,745	23,782	23,844	23,882	23,909	23,929	23,745	23,929	23,849
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sweden	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
United Kingdom	725,118	731,061	736,546	741,301	746,473	752,552	725,118	752,552	738,842

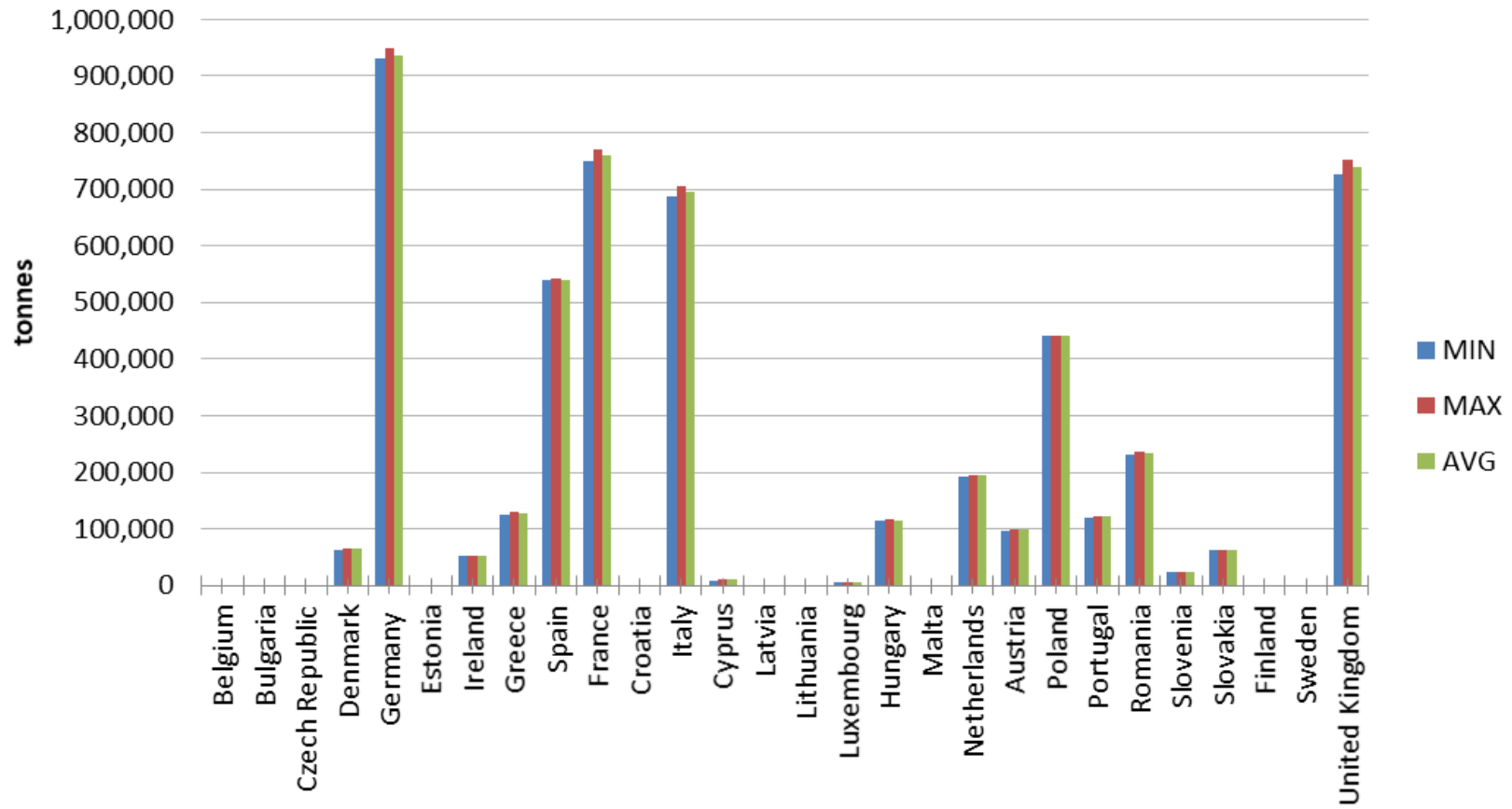


Figure 11 Consumption of fresh apples (tonnes) per country, 2010-2015

Table 10 Tonnes of rotten apples per country, 2010-2015

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	12,199	12,256	12,299	12,348	12,402	12,474	12,199	12,474	12,330
Germany	180,292	176,809	177,043	177,474	178,011	178,959	176,809	180,292	178,098
Estonia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	10,027	10,074	10,100	10,119	10,151	10,202	10,027	10,202	10,112
Greece	24,507	24,516	24,434	24,252	24,083	23,931	23,931	24,516	24,287
Spain	102,457	102,854	103,187	102,988	102,513	102,375	102,375	103,187	102,729
France	142,508	143,213	143,870	144,583	145,336	146,540	142,508	146,540	144,342
Croatia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy	130,455	130,840	130,905	131,546	133,965	133,994	130,455	133,994	131,951
Cyprus	1,805	1,851	1,900	1,908	1,891	1,867	1,805	1,908	1,870
Latvia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lithuania	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Luxembourg	1,107	1,128	1,157	1,184	1,211	1,241	1,107	1,241	1,171
Hungary	22,072	22,009	21,890	21,839	21,770	21,722	21,722	22,072	21,883
Malta	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	36,531	36,709	36,874	36,982	37,092	37,249	36,531	37,249	36,906
Austria	18,407	18,459	18,531	18,628	18,749	18,902	18,407	18,902	18,613
Poland	83,802	83,890	83,893	83,890	83,791	83,764	83,764	83,893	83,838
Portugal	23,304	23,302	23,235	23,114	22,982	22,866	22,866	23,304	23,134
Romania	44,729	44,519	44,292	44,124	43,964	43,795	43,795	44,729	44,237
Slovenia	4,512	4,519	4,530	4,538	4,543	4,547	4,512	4,547	4,531
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sweden	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
United Kingdom	137,772	138,902	139,944	140,847	141,830	142,985	137,772	142,985	140,380

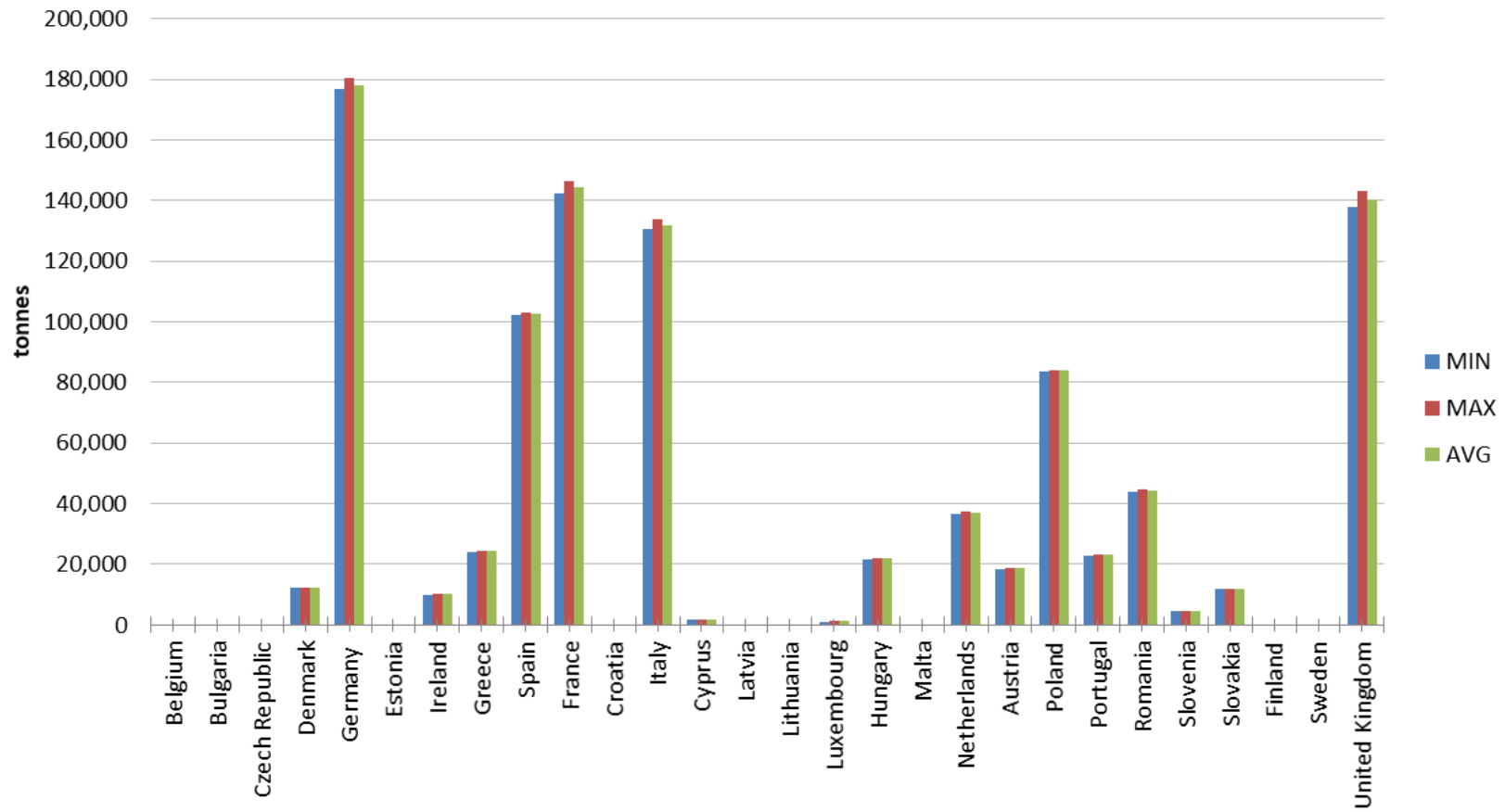


Figure 12 Tonnes of rotten apples per country, 2010-2015

2.2 Grape

Grape is mainly cultivated for raw consumption as a fruit and for wine production. Steps in domestic production of the vine may differ from industrial due to the different capacity of processing (29). During the cultivation stage, the main AWCB produced are pruning residues (Figure 13) and leaves. In the past, these materials were mostly collected and burned, which is still practised in some European countries today.



Figure 13 Grape pruning residues (29)

There are a number of steps in grape processing for wine production (30). After the grape is collected from vineyards it is crushed and pressed in order to separate liquid form from pomace (skin, pulp, seed and stalks), Figure 14.



Figure 14 Grape pomace after pressing (31)

The next step is fermentation, a biochemical process where the sugar is converted to ethanol and carbon dioxide in a presence of oxygen. Carbon dioxide is also characterized as an AWCB, although in higher concentration it can potentially be dangerous. Figure 15 presents fermentation of white wine and carbon dioxide formation on top.



Figure 15 Fermentation of white wine (32)

When the fermentation is over, the process of clarification begins. On the bottom of a vat, the residual yeast (the lees) settles down, Figure 16.



Figure 16 Clarification of wine and lees depositing (33)

The flowchart (Figure 17) presents the value chain for grape and specific AWCB weight factors from Table 2.

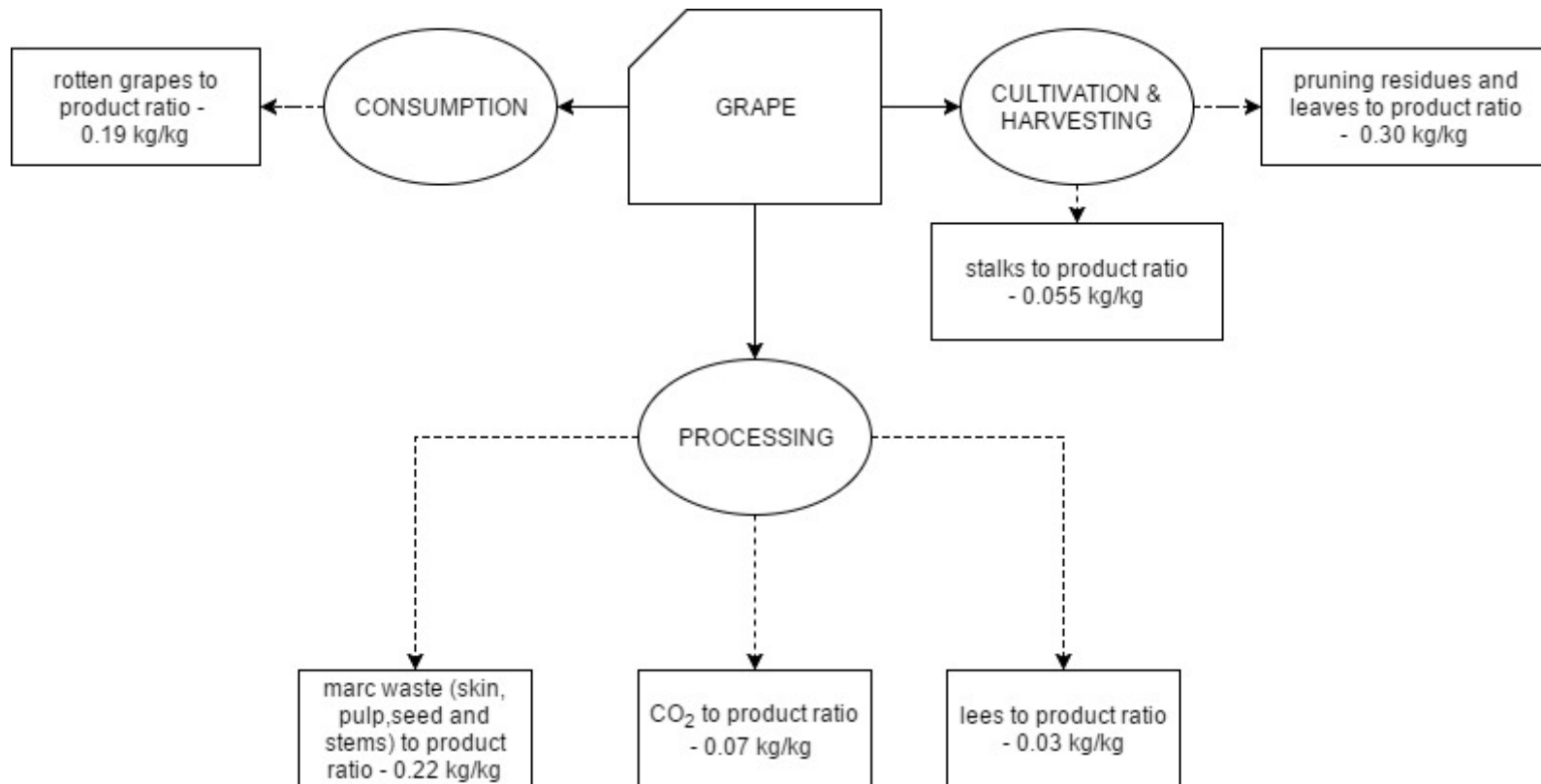


Figure 17 Grape AWCB value chain

Data for the cultivated grape is taken from EUROSTAT, and data for imported and exported grape is taken from FAOSTAT. From specific consumption of grape and population in the country, amount of consumed grape is calculated. By using relationship defined (I-VIII) the quantity of processed grape is calculated for every country in each given year. Then the quantity of AWCB is calculated for every step and every year. An example of the calculation for Croatia in 2010 is presented below:

PRD = 207,740 tonnes

IMP = 8,619 tonnes

EXP = 45 tonnes

CON = 23,666 tonnes

PRC = $207,740 + 8,619 - (45 + 23,666)$ tonnes = 192,648 tonnes

The quantity of pruning residues and leaves is 0.30 kg per kg of the harvested grape: for Croatia, it was 62,322 tonnes in 2010. Also, 11,426 tonnes of stalks occurred in Croatia in 2010. Grape marc (pomace) that occurs in processing step takes 0.22 kg per kg of processed grape. For Croatia, the quantity of grape pomace was 42,383 tonnes in 2010. Carbon dioxide that releases during fermentation process takes 0.07 kg per kg of processed grape. In Croatia, 13,485 tonnes of carbon dioxide occurred during fermentation in 2010. Furthermore, 0.03 kg lees occur per kg of the processed grape: for Croatia, that number was 5,779 tonnes in 2010. The quantity of consumed grape was 23,666 tonnes, from which 4,496 tonnes went rotten. Results for other countries are shown in the tables and figures below.

Table 11 Tonnes of harvested grapes per country, 2010-2015 (27)

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	0	0	0	0	0	0	0	0	0
Bulgaria	230,100	243,800	260,670	325,600	132,730	261,820	132,730	325,600	242,453
Czech Republic	45,920	91,250	59,990	74,720	63,530	90,610	45,920	91,250	71,003
Denmark	0	0	0	0	0	0	0	0	0
Germany	0	0	0	0	0	0	0	0	0
Estonia	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0
Greece	1,002,920	856,590	978,190	1,059,860	1,044,490	981,860	856,590	1,059,860	987,318
Spain	6,107,620	5,809,320	5,566,620	7,480,020	6,221,660	5,799,130	5,566,620	7,480,020	6,164,062
France	5,920,360	6,649,090	5,379,740	5,540,840	6,204,910	6,258,400	5,379,740	6,649,090	5,992,223
Croatia	207,740	204,370	183,480	182,180	134,940	154,230	134,940	207,740	177,823
Italy	7,787,790	7,115,600	6,903,760	8,010,360	6,930,790	7,915,010	6,903,760	8,010,360	7,443,885
Cyprus	28,350	25,110	20,580	20,390	20,190	21,710	20,190	28,350	22,722
Latvia	0	0	0	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0	0	0
Luxembourg	14,660	17,570	11,320	13,430	16,630	14,740	11,320	17,570	14,725
Hungary	294,770	449,870	356,360	451,120	406,030	472,350	294,770	472,350	405,083
Malta	4,080	3,920	5,520	5,260	5,360	5,110	3,920	5,520	4,875
Netherlands	0	0	0	0	0	1,480	0	1,480	247
Austria	231,660	375,300	287,300	318,930	266,490	302,450	231,660	375,300	297,022
Poland	1,300	1,200	1,500	3,100	3,400	3,000	1,200	3,400	2,250
Portugal	947,300	746,510	841,620	827,750	818,510	934,630	746,510	947,300	852,720
Romania	734,600	873,910	742,070	988,130	779,770	794,940	734,600	988,130	818,903
Slovenia	108,540	121,400	92,380	100,200	94,280	117,700	92,380	121,400	105,750
Slovakia	21,120	49,020	52,210	53,220	38,450	50,160	21,120	53,220	44,030
Finland	0	0	0	0	0	0	0	0	0
Sweden	40	10	40	50	90	70	10	90	50
United Kingdom	4,500	0	0	0	2,700	4,010	0	4,500	1,868

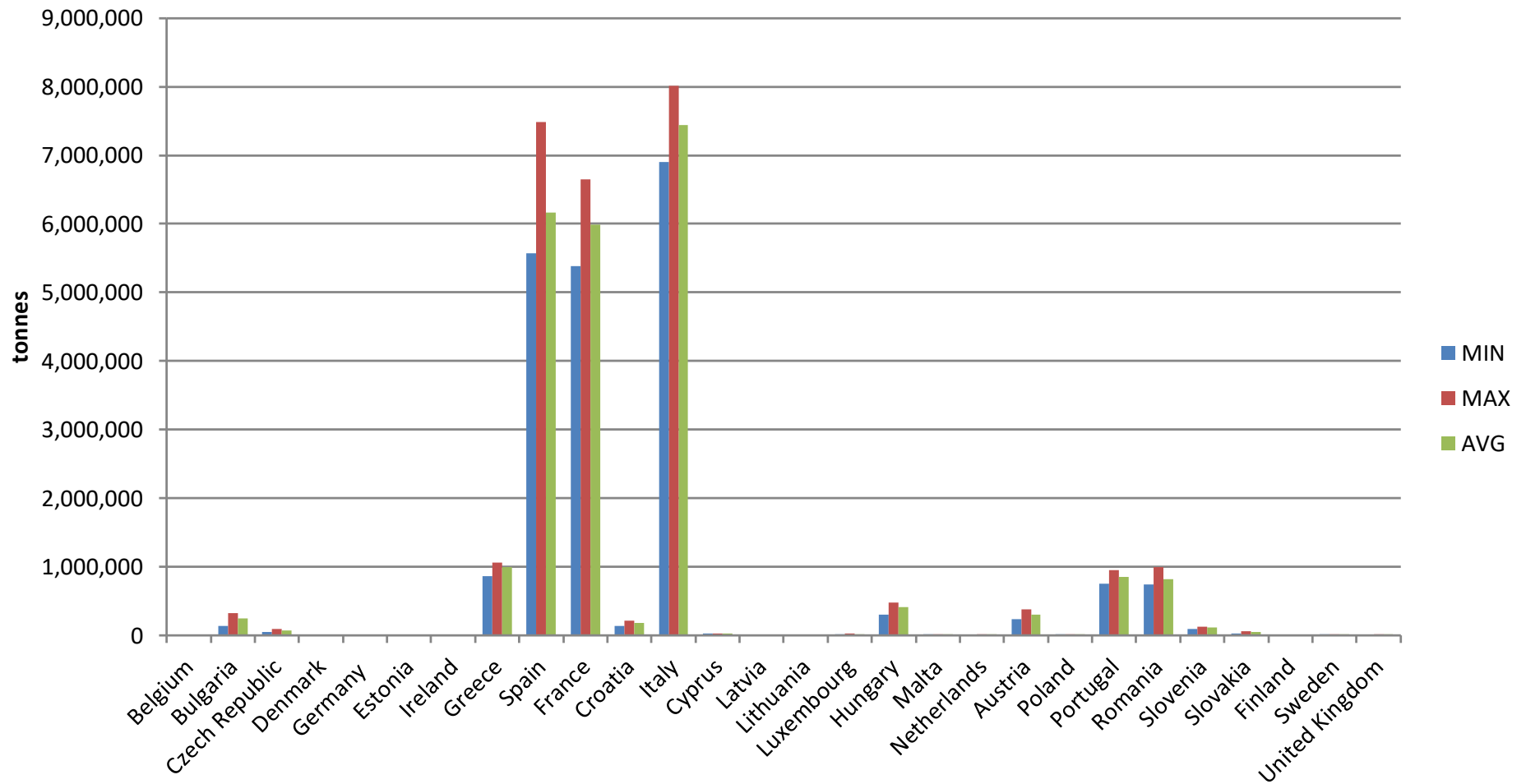


Figure 18 Tonnes of harvested grapes per country, 2010-2015

Table 12 Tonnes of grape pruning residues and leaves per country, 2010-2015

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	0	0	0	0	0	0	0	0	0
Bulgaria	69,030	73,140	78,201	97,680	39,819	78,546	39,819	97,680	72,736
Czech Republic	13,776	27,375	17,997	22,416	19,059	27,183	13,776	27,375	21,301
Denmark	0	0	0	0	0	0	0	0	0
Germany	0	0	0	0	0	0	0	0	0
Estonia	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0
Greece	300,876	256,977	293,457	317,958	313,347	294,558	256,977	317,958	296,196
Spain	1,832,286	1,742,796	1,669,986	2,244,006	1,866,498	1,739,739	1,669,986	2,244,006	1,849,219
France	1,776,108	1,994,727	1,613,922	1,662,252	1,861,473	1,877,520	1,613,922	1,994,727	1,797,667
Croatia	62,322	61,311	55,044	54,654	40,482	46,269	40,482	62,322	53,347
Italy	2,336,337	2,134,680	2,071,128	2,403,108	2,079,237	2,374,503	2,071,128	2,403,108	2,233,166
Cyprus	8,505	7,533	6,174	6,117	6,057	6,513	6,057	8,505	6,817
Latvia	0	0	0	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0	0	0
Luxembourg	4,398	5,271	3,396	4,029	4,989	4,422	3,396	5,271	4,418
Hungary	88,431	134,961	106,908	135,336	121,809	141,705	88,431	141,705	121,525
Malta	1,224	1,176	1,656	1,578	1,608	1,533	1,176	1,656	1,463
Netherlands	0	0	0	0	0	444	0	444	74
Austria	69,498	112,590	86,190	95,679	79,947	90,735	69,498	112,590	89,107
Poland	390	360	450	930	1,020	900	360	1,020	675
Portugal	284,190	223,953	252,486	248,325	245,553	280,389	223,953	284,190	255,816
Romania	220,380	262,173	222,621	296,439	233,931	238,482	220,380	296,439	245,671
Slovenia	32,562	36,420	27,714	30,060	28,284	35,310	27,714	36,420	31,725
Slovakia	6,336	14,706	15,663	15,966	11,535	15,048	6,336	15,966	13,209
Finland	0	0	0	0	0	0	0	0	0
Sweden	12	3	12	15	27	21	3	27	15
United Kingdom	1,350	0	0	0	810	1,203	0	1,350	561

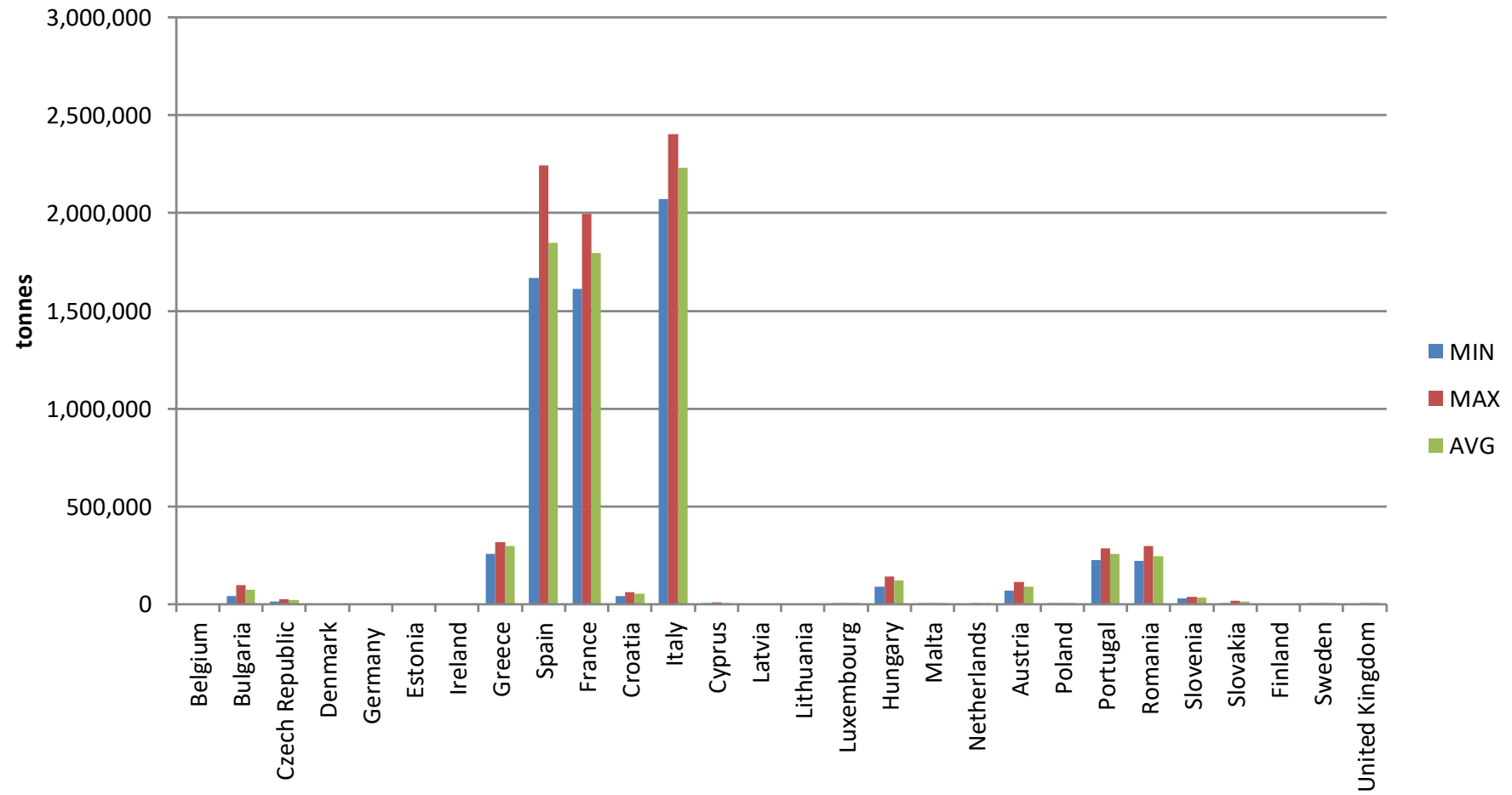


Figure 19 Tonnes of grape pruning residues and leaves per country, 2010-2015

Table 13 Tonnes of grape stalks per country, 2010-2015

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	0	0	0	0	0	0	0	0	0
Bulgaria	12,656	13,409	14,337	17,908	7,300	14,400	7,300	17,908	13,335
Czech Republic	2,526	5,019	3,299	4,110	3,494	4,984	2,526	5,019	3,905
Denmark	0	0	0	0	0	0	0	0	0
Germany	0	0	0	0	0	0	0	0	0
Estonia	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0
Greece	55,161	47,112	53,800	58,292	57,447	54,002	47,112	58,292	54,303
Spain	335,919	319,513	306,164	411,401	342,191	318,952	306,164	411,401	339,023
France	325,620	365,700	295,886	304,746	341,270	344,212	295,886	365,700	329,572
Croatia	11,426	11,240	10,091	10,020	7,422	8,483	7,422	11,426	9,780
Italy	428,328	391,358	379,707	440,570	381,193	435,326	379,707	440,570	409,414
Cyprus	1,559	1,381	1,132	1,121	1,110	1,194	1,110	1,559	1,250
Latvia	0	0	0	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0	0	0
Luxembourg	806	966	623	739	915	811	623	966	810
Hungary	16,212	24,743	19,600	24,812	22,332	25,979	16,212	25,979	22,280
Malta	224	216	304	289	295	281	216	304	268
Netherlands	0	0	0	0	0	81	0	81	14
Austria	12,741	20,642	15,802	17,541	14,657	16,635	12,741	20,642	16,336
Poland	72	66	83	171	187	165	66	187	124
Portugal	52,102	41,058	46,289	45,526	45,018	51,405	41,058	52,102	46,900
Romania	40,403	48,065	40,814	54,347	42,887	43,722	40,403	54,347	45,040
Slovenia	5,970	6,677	5,081	5,511	5,185	6,474	5,081	6,677	5,816
Slovakia	1,162	2,696	2,872	2,927	2,115	2,759	1,162	2,927	2,422
Finland	0	0	0	0	0	0	0	0	0
Sweden	2	1	2	3	5	4	1	5	3
United Kingdom	248	0	0	0	149	221	0	248	103

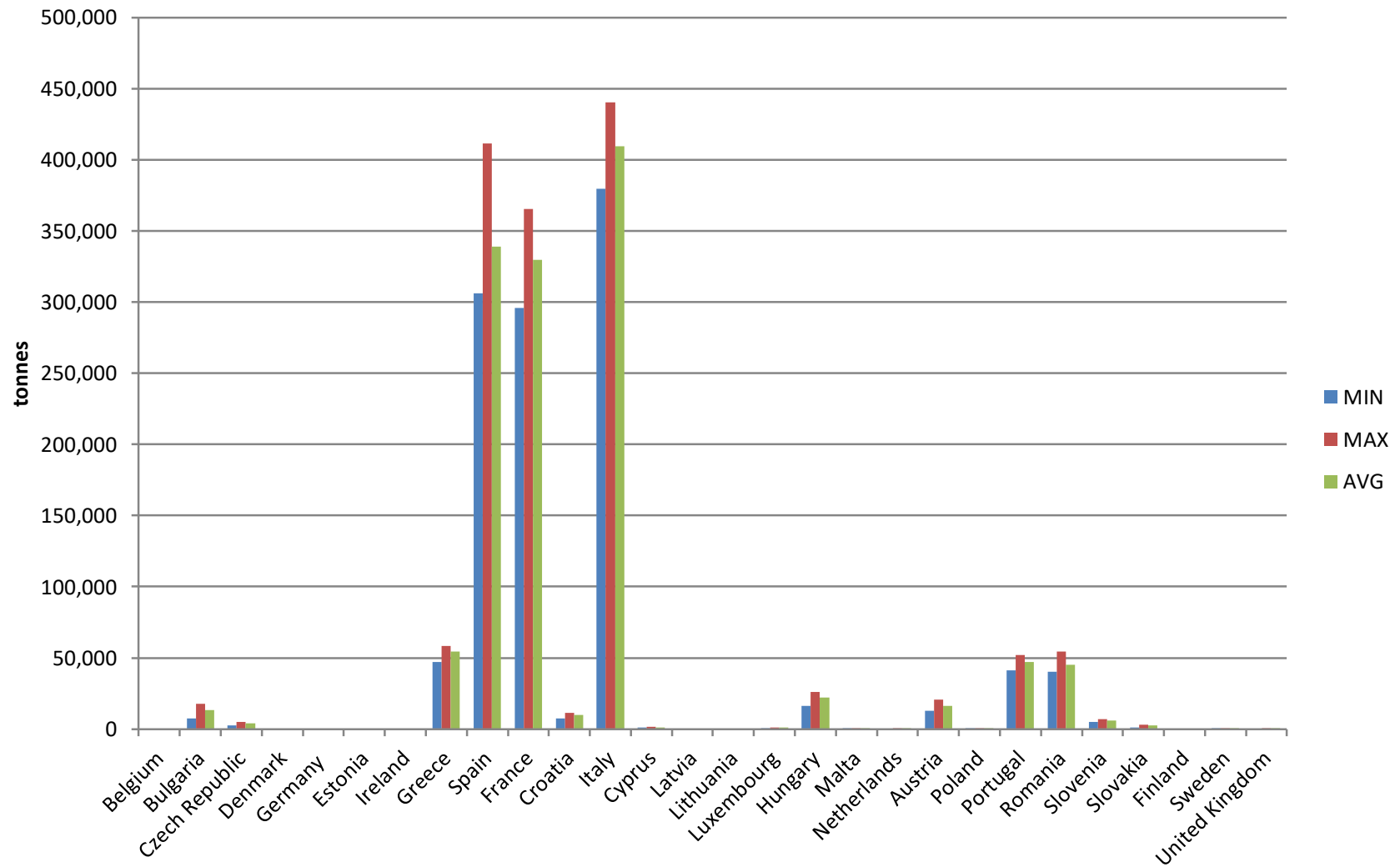


Figure 20 Tonnes of grape stalks per country, 2010-2015

Table 14 Tonnes of imported and exported grape per country, 2010-2013 (28)

GEO/POPULATION	Trade	2010	2011	2012	2013
Belgium	Import	57,824	47,879	50,394	54,505
	Export	17,313	8,210	9,244	10,191
Bulgaria	Import	3,093	4,340	7,635	5,331
	Export	985	1,404	2,182	1,172
Czech Republic	Import	43,316	45,234	40,852	44,892
	Export	3,371	3,222	3,141	4,119
Denmark	Import	33,256	26,011	23,394	21,342
	Export	3,897	3,733	3,398	2,016
Germany	Import	276,934	300,226	296,293	315,291
	Export	29,465	34,691	32,013	33,981
Estonia	Import	4,343	4,258	4,482	4,432
	Export	11	18	2	1
Ireland	Import	14,404	11,246	10,143	10,029
	Export	1,698	236	141	416
Greece	Import	4,001	2,016	1,454	1,198
	Export	64,968	72,063	66,692	93,504
Spain	Import	42,689	42,490	33,683	33,974
	Export	126,653	140,601	129,113	140,535
France	Import	130,897	156,116	148,842	144,782
	Export	14,729	16,218	17,618	14,740
Croatia	Import	8,619	9,073	10,115	6,806
	Export	45	0	0	58
Italy	Import	23,056	23,735	22,967	19,097
	Export	479,398	498,110	491,368	508,018
Cyprus	Import	2,231	2,068	1,407	2,326
	Export	245	266	361	514
Latvia	Import	5,351	6,283	5,974	6,016
	Export	982	1,936	1,851	1,146
Lithuania	Import	26,223	27,241	34,399	40,492
	Export	20,560	21,498	28,475	32,951
Luxembourg	Import	2,359	2,250	2,282	2,225
	Export	211	245	217	186

Hungary	Import	5,663	5,393	4,621	5,073
	Export	2,840	1,115	470	2,831
Malta	Import	465	871	771	549
	Export	109	0	0	0
Netherlands	Import	355,398	327,948	351,755	361,089
	Export	253,680	263,347	275,512	287,297
Austria	Import	49,359	51,953	49,760	43,351
	Export	19,819	23,510	17,953	10,400
Poland	Import	105,354	106,339	114,482	119,691
	Export	12,328	12,933	18,249	18,058
Portugal	Import	27,467	30,880	24,244	27,501
	Export	2,837	6,416	4,894	5,447
Romania	Import	11,086	14,063	26,336	22,107
	Export	271	431	1,748	1,268
Slovenia	Import	8,772	6,735	9,092	9,004
	Export	7,978	7,568	11,511	6,332
Slovakia	Import	18,564	17,577	16,264	18,225
	Export	1,055	1,037	2,241	1,854
Finland	Import	19,696	16,083	15,235	15,496
	Export	45	2	8	30
Sweden	Import	25,120	27,485	28,336	28,020
	Export	213	290	662	1,096
United Kingdom	Import	245,579	231,033	246,103	250,073
	Export	6,613	5,321	6,615	9,318

Table 15 Tonnes of processed grapes per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	403	0	99	3,016	0	3,016	880
Bulgaria	202,521	217,258	236,814	300,621	202,521	300,621	239,304
Czech Republic	40,878	88,169	52,528	70,274	40,878	88,169	62,962
Denmark	1,132	0	0	0	0	1,132	283
Germany	2,062	24,869	23,296	39,739	2,062	39,739	22,492
Estonia	0	0	107	74	0	107	45
Ireland	1,332	0	0	0	0	1,332	333
Greece	784,059	628,591	755,525	811,303	628,591	811,303	744,869
Spain	5,865,601	5,552,541	5,312,008	7,214,584	5,312,008	7,214,584	5,986,184
France	5,868,415	6,620,043	5,341,244	5,500,321	5,341,244	6,620,043	5,832,506
Croatia	192,648	189,849	170,077	165,486	165,486	192,648	179,515
Italy	6,544,219	5,851,675	5,645,416	6,727,625	5,645,416	6,727,625	6,192,234
Cyprus	26,240	22,713	17,316	17,873	17,316	26,240	21,036
Latvia	2,673	2,687	2,487	3,251	2,487	3,251	2,775
Lithuania	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Luxembourg	14,850	17,579	11,338	13,375	11,338	17,579	14,285
Hungary	247,521	404,219	310,851	403,818	247,521	404,219	341,603
Malta	3,070	3,422	4,913	4,418	3,070	4,913	3,956
Netherlands	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Austria	227,793	370,242	285,475	318,074	227,793	370,242	300,396
Poland	10,676	10,868	13,993	20,995	10,676	20,995	14,133
Portugal	894,744	693,793	784,010	773,247	693,793	894,744	786,449
Romania	684,531	826,945	706,370	948,909	684,531	948,909	791,689
Slovenia	77,196	88,379	57,690	70,549	57,690	88,379	73,453
Slovakia	26,231	53,157	53,803	57,146	26,231	57,146	47,584
Finland	386	0	0	0	0	386	96
Sweden	N/A	N/A	N/A	N/A	N/A	N/A	N/A
United Kingdom	30,931	11,435	23,604	23,477	11,435	30,931	22,362

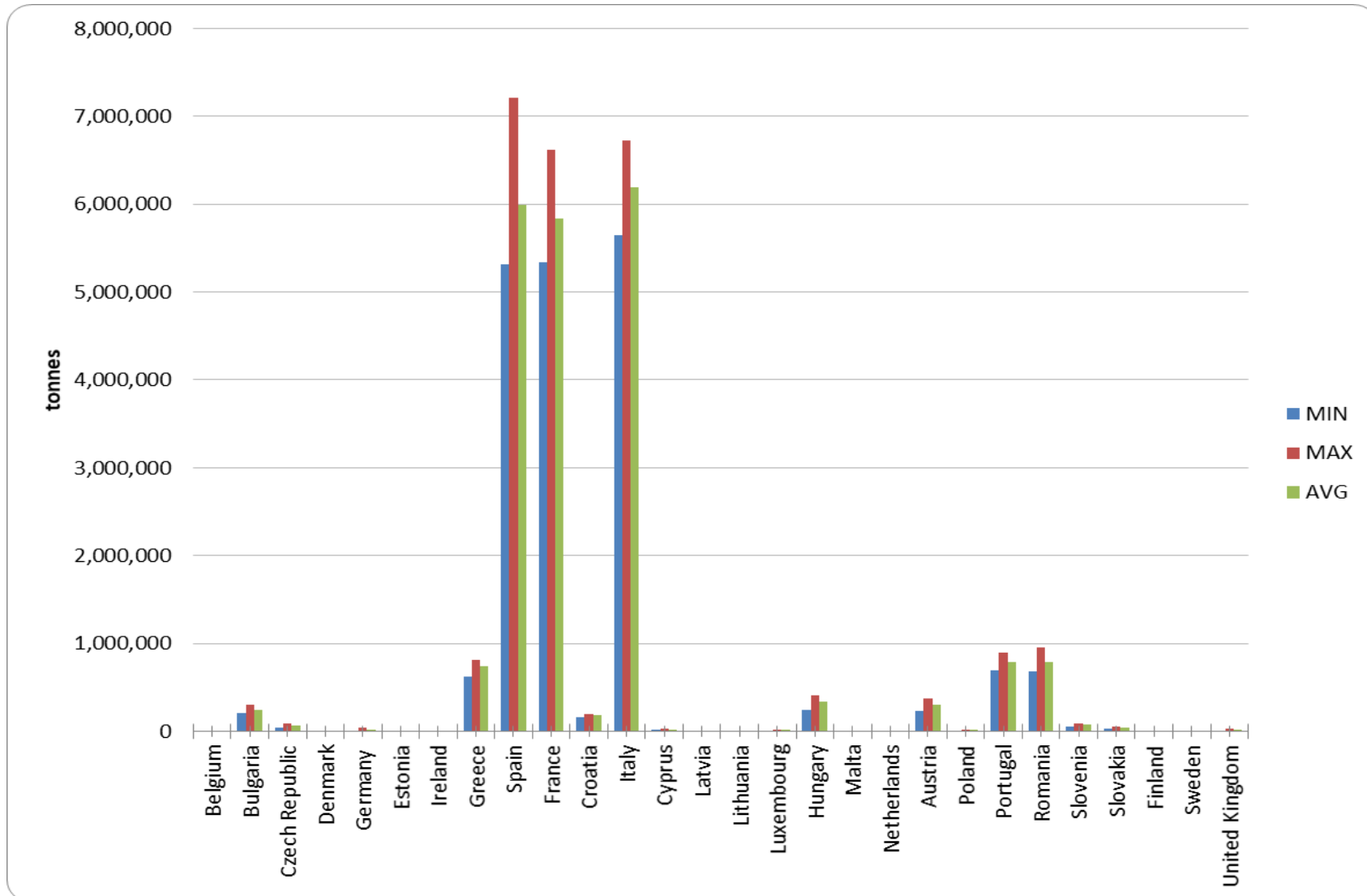


Figure 21 Tonnes of processed grapes per country, 2010-2013

Table 16 Tonnes of grape marc waste per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	89	0	22	664	0	664	194
Bulgaria	44,555	47,797	52,099	66,137	44,555	66,137	52,647
Czech Republic	8,993	19,397	11,556	15,460	8,993	19,397	13,852
Denmark	249	0	0	0	0	249	62
Germany	454	5,471	5,125	8,743	454	8,743	4,948
Estonia	0	0	23	16	0	23	10
Ireland	293	0	0	0	0	293	73
Greece	172,493	138,290	166,216	178,487	138,290	178,487	163,871
Spain	1,290,432	1,221,559	1,168,642	1,587,209	1,168,642	1,587,209	1,316,960
France	1,291,051	1,456,410	1,175,074	1,210,071	1,175,074	1,456,410	1,283,151
Croatia	42,383	41,767	37,417	36,407	36,407	42,383	39,493
Italy	1,439,728	1,287,368	1,241,992	1,480,078	1,241,992	1,480,078	1,362,291
Cyprus	5,773	4,997	3,810	3,932	3,810	5,773	4,628
Latvia	588	591	547	715	547	715	610
Lithuania	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Luxembourg	3,267	3,867	2,494	2,942	2,494	3,867	3,143
Hungary	54,455	88,928	68,387	88,840	54,455	88,928	75,153
Malta	675	753	1,081	972	675	1,081	870
Netherlands	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Austria	50,115	81,453	62,804	69,976	50,115	81,453	66,087
Poland	2,349	2,391	3,078	4,619	2,349	4,619	3,109
Portugal	196,844	152,634	172,482	170,114	152,634	196,844	173,019
Romania	150,597	181,928	155,401	208,760	150,597	208,760	174,172
Slovenia	16,983	19,443	12,692	15,521	12,692	19,443	16,160
Slovakia	5,771	11,695	11,837	12,572	5,771	12,572	10,469
Finland	85	0	0	0	0	85	21
Sweden	N/A	N/A	N/A	N/A	N/A	N/A	N/A
United Kingdom	6,805	2,516	5,193	5,165	2,516	6,805	4,920

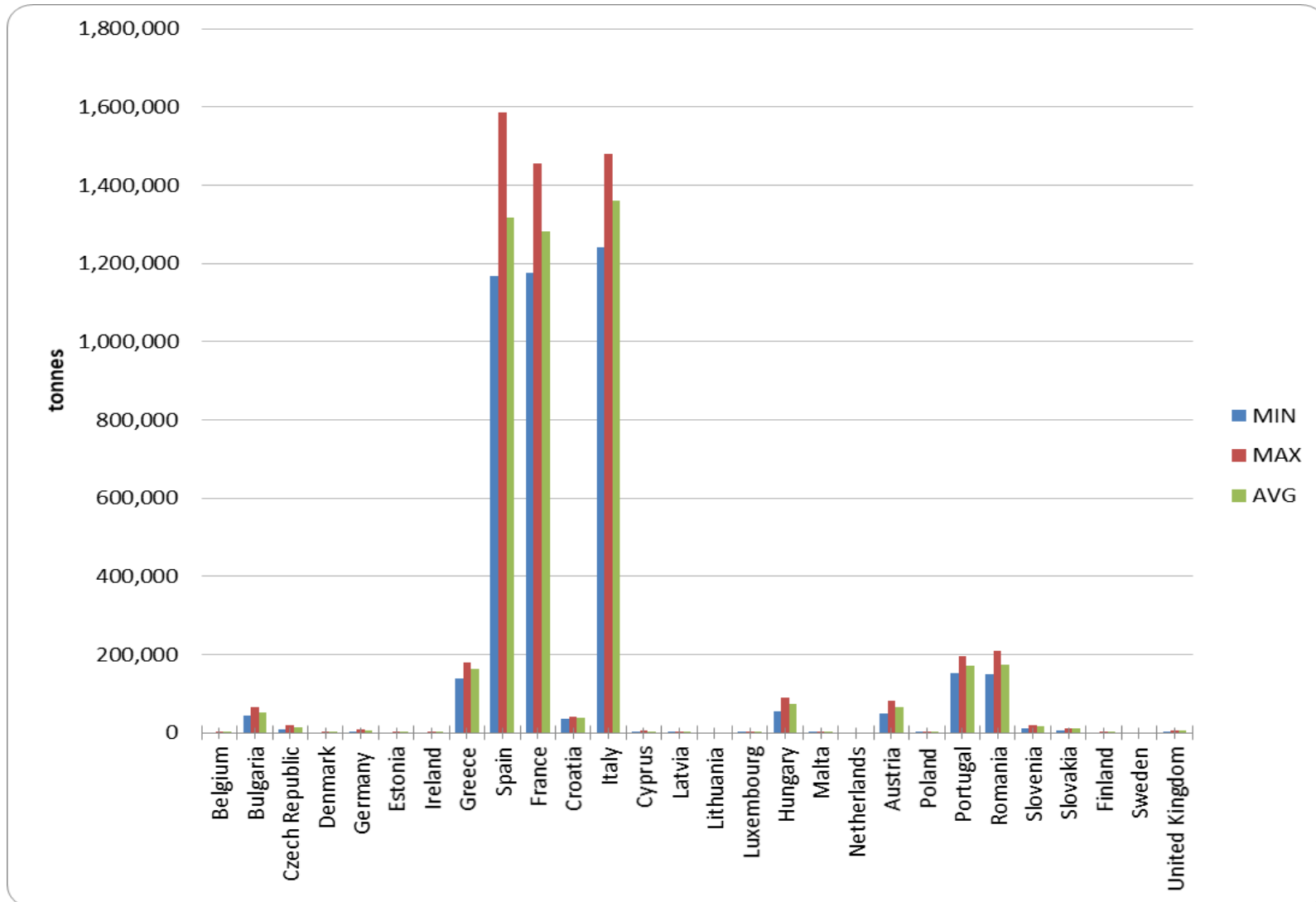


Figure 22 Tonnes of grape marc waste per country, 2010-2013

Table 17 Tonnes of carbon dioxide from grape processing per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	28	0	7	211	0	211	62
Bulgaria	14,176	15,208	16,577	21,043	14,176	21,043	16,751
Czech Republic	2,861	6,172	3,677	4,919	2,861	6,172	4,407
Denmark	79	0	0	0	0	79	20
Germany	144	1,741	1,631	2,782	144	2,782	1,574
Estonia	0	0	7	5	0	7	3
Ireland	93	0	0	0	0	93	23
Greece	54,884	44,001	52,887	56,791	44,001	56,791	52,141
Spain	410,592	388,678	371,841	505,021	371,841	505,021	419,033
France	410,789	463,403	373,887	385,022	373,887	463,403	408,275
Croatia	13,485	13,289	11,905	11,584	11,584	13,485	12,566
Italy	458,095	409,617	395,179	470,934	395,179	470,934	433,456
Cyprus	1,837	1,590	1,212	1,251	1,212	1,837	1,472
Latvia	187	188	174	228	174	228	194
Lithuania	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Luxembourg	1,039	1,231	794	936	794	1,231	1,000
Hungary	17,326	28,295	21,760	28,267	17,326	28,295	23,912
Malta	215	240	344	309	215	344	277
Netherlands	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Austria	15,946	25,917	19,983	22,265	15,946	25,917	21,028
Poland	747	761	979	1,470	747	1,470	989
Portugal	62,632	48,566	54,881	54,127	48,566	62,632	55,051
Romania	47,917	57,886	49,446	66,424	47,917	66,424	55,418
Slovenia	5,404	6,187	4,038	4,938	4,038	6,187	5,142
Slovakia	1,836	3,721	3,766	4,000	1,836	4,000	3,331
Finland	27	0	0	0	0	27	7
Sweden	N/A	N/A	N/A	N/A	N/A	N/A	N/A
United Kingdom	2,165	800	1,652	1,643	800	2,165	1,565

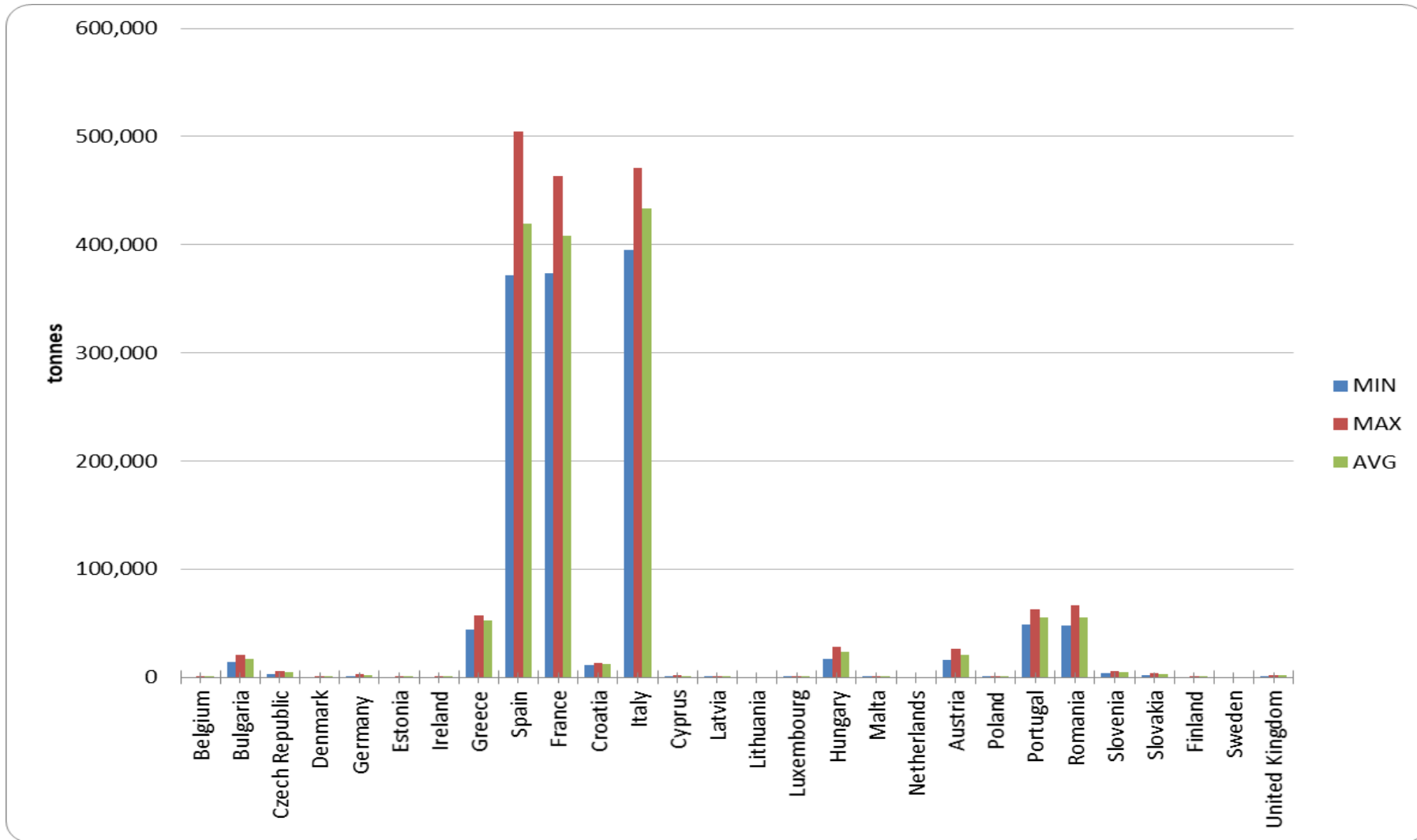


Figure 23 Tonnes of carbon dioxide from grape processing per country, 2010-2013

Table 18 Tonnes of grape lees per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	12	0	3	90	0	90	26
Bulgaria	6,076	6,518	7,104	9,019	6,076	9,019	7,179
Czech Republic	1,226	2,645	1,576	2,108	1,226	2,645	1,889
Denmark	34	0	0	0	0	34	8
Germany	62	746	699	1,192	62	1,192	675
Estonia	0	0	3	2	0	3	1
Ireland	40	0	0	0	0	40	10
Greece	23,522	18,858	22,666	24,339	18,858	24,339	22,346
Spain	175,968	166,576	159,360	216,438	159,360	216,438	179,586
France	176,052	198,601	160,237	165,010	160,237	198,601	174,975
Croatia	5,779	5,695	5,102	4,965	4,965	5,779	5,385
Italy	196,327	175,550	169,362	201,829	169,362	201,829	185,767
Cyprus	787	681	519	536	519	787	631
Latvia	80	81	75	98	75	98	83
Lithuania	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Luxembourg	445	527	340	401	340	527	429
Hungary	7,426	12,127	9,326	12,115	7,426	12,127	10,248
Malta	92	103	147	133	92	147	119
Netherlands	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Austria	6,834	11,107	8,564	9,542	6,834	11,107	9,012
Poland	320	326	420	630	320	630	424
Portugal	26,842	20,814	23,520	23,197	20,814	26,842	23,593
Romania	20,536	24,808	21,191	28,467	20,536	28,467	23,751
Slovenia	2,316	2,651	1,731	2,116	1,731	2,651	2,204
Slovakia	787	1,595	1,614	1,714	787	1,714	1,428
Finland	12	0	0	0	0	12	3
Sweden	N/A	N/A	N/A	N/A	N/A	N/A	N/A
United Kingdom	928	343	708	704	343	928	671

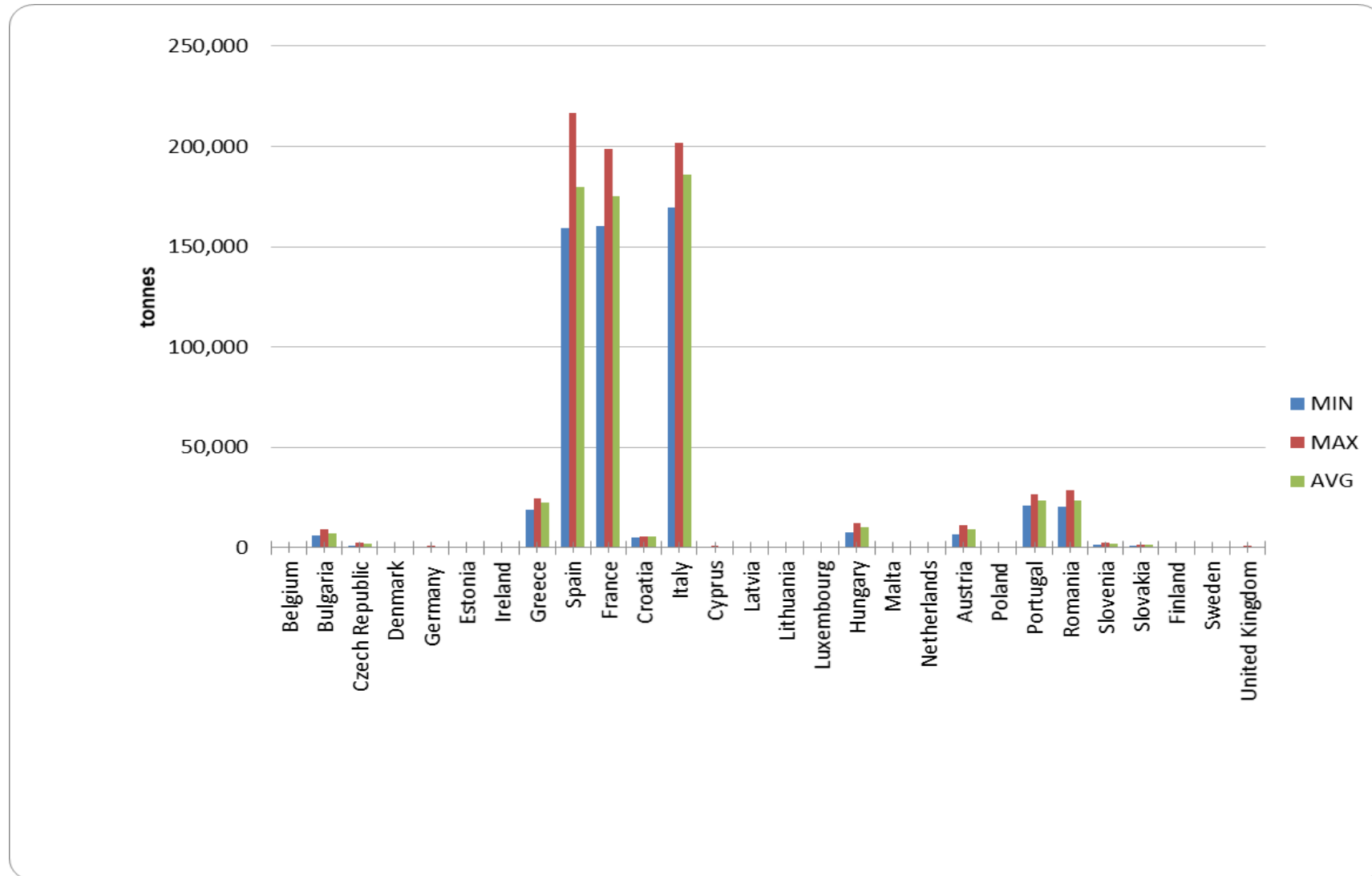


Figure 24 Tonnes of grape lees per country, 2010-2013

Table 19 Consumption of fresh grapes (tonnes) per country, 2010-2015

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	40,108	40,702	41,051	41,298	41,369	41,578	40,108	41,578	41,018
Bulgaria	29,687	29,478	29,309	29,138	28,983	28,809	28,809	29,687	29,234
Czech Republic	44,987	45,093	45,173	45,219	45,203	45,315	44,987	45,315	45,165
Denmark	28,227	28,359	28,461	28,573	28,699	28,865	28,227	28,865	28,531
Germany	245,407	240,666	240,984	241,571	242,302	243,593	240,666	245,407	242,420
Estonia	4,400	4,388	4,373	4,357	4,342	4,339	4,339	4,400	4,366
Ireland	11,374	11,427	11,457	11,478	11,514	11,572	11,374	11,572	11,470
Greece	157,894	157,952	157,427	156,251	155,161	154,184	154,184	157,952	156,478
Spain	158,055	158,668	159,182	158,875	158,141	157,929	157,929	159,182	158,475
France	168,113	168,945	169,720	170,561	171,449	172,869	168,113	172,869	170,276
Croatia	23,666	23,594	23,518	23,442	23,357	23,239	23,239	23,666	23,469
Italy	787,229	789,550	789,943	793,814	808,409	808,582	787,229	808,582	796,254
Cyprus	4,096	4,199	4,310	4,329	4,290	4,235	4,096	4,329	4,243
Latvia	1,696	1,660	1,636	1,619	1,601	1,589	1,589	1,696	1,634
Lithuania	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Luxembourg	1,958	1,996	2,047	2,094	2,144	2,196	1,958	2,196	2,072
Hungary	50,072	49,929	49,660	49,544	49,387	49,278	49,278	50,072	49,645
Malta	1,366	1,369	1,378	1,391	1,404	1,417	1,366	1,417	1,387
Netherlands	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Austria	33,407	33,501	33,632	33,807	34,028	34,305	33,407	34,305	33,780
Poland	83,650	83,738	83,740	83,738	83,639	83,612	83,612	83,740	83,686
Portugal	77,186	77,181	76,960	76,557	76,119	75,736	75,736	77,186	76,623
Romania	60,884	60,597	60,288	60,060	59,842	59,612	59,612	60,884	60,214
Slovenia	32,138	32,188	32,271	32,323	32,359	32,387	32,138	32,387	32,278
Slovakia	12,398	12,403	12,430	12,445	12,457	12,469	12,398	12,469	12,434
Finland	19,265	19,351	19,445	19,536	19,625	19,698	19,265	19,698	19,487
Sweden	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
United Kingdom	212,535	214,277	215,884	217,278	218,794	220,576	212,535	220,576	216,557

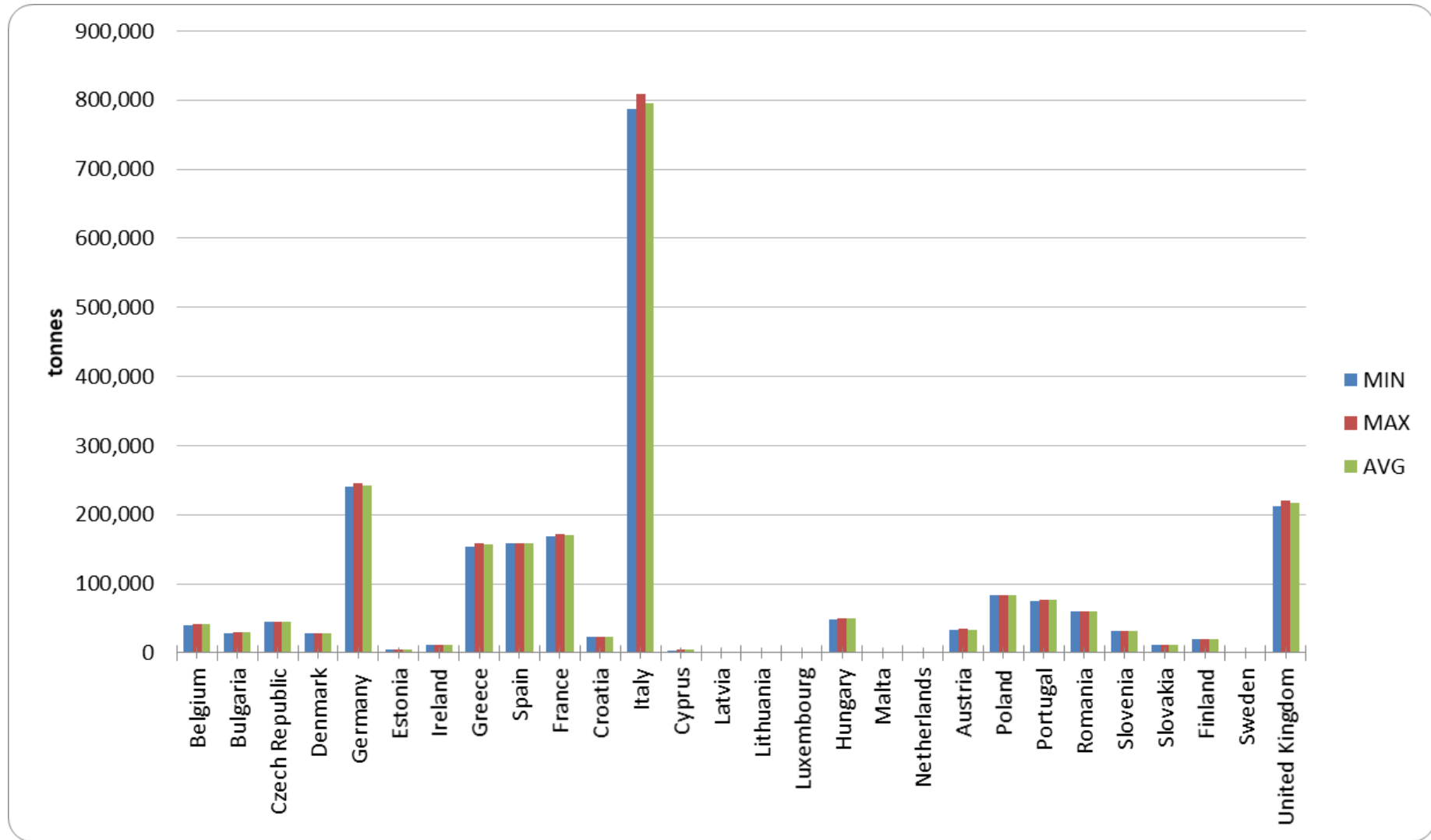


Figure 25 Consumption of fresh grapes (tonnes) per country, 2010-2015

Table 20 Tonnes of rotten grapes per country, 2010-2015

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	7,620	7,733	7,800	7,847	7,860	7,900	7,620	7,900	7,793
Bulgaria	5,641	5,601	5,569	5,536	5,507	5,474	5,474	5,641	5,554
Czech Republic	8,548	8,568	8,583	8,592	8,589	8,610	8,548	8,610	8,581
Denmark	5,363	5,388	5,408	5,429	5,453	5,484	5,363	5,484	5,421
Germany	46,627	45,727	45,787	45,899	46,037	46,283	45,727	46,627	46,060
Estonia	836	834	831	828	825	824	824	836	830
Ireland	2,161	2,171	2,177	2,181	2,188	2,199	2,161	2,199	2,179
Greece	30,000	30,011	29,911	29,688	29,481	29,295	29,295	30,011	29,731
Spain	30,030	30,147	30,245	30,186	30,047	30,006	30,006	30,245	30,110
France	31,941	32,099	32,247	32,407	32,575	32,845	31,941	32,845	32,352
Croatia	4,496	4,483	4,468	4,454	4,438	4,415	4,415	4,496	4,459
Italy	149,573	150,015	150,089	150,825	153,598	153,631	149,573	153,631	151,288
Cyprus	778	798	819	823	815	805	778	823	806
Latvia	322	315	311	308	304	302	302	322	310
Lithuania	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Luxembourg	372	379	389	398	407	417	372	417	394
Hungary	9,514	9,486	9,435	9,413	9,383	9,363	9,363	9,514	9,433
Malta	260	260	262	264	267	269	260	269	264
Netherlands	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Austria	6,347	6,365	6,390	6,423	6,465	6,518	6,347	6,518	6,418
Poland	15,894	15,910	15,911	15,910	15,891	15,886	15,886	15,911	15,900
Portugal	14,665	14,664	14,622	14,546	14,463	14,390	14,390	14,665	14,558
Romania	11,568	11,513	11,455	11,411	11,370	11,326	11,326	11,568	11,441
Slovenia	6,106	6,116	6,132	6,141	6,148	6,154	6,106	6,154	6,133
Slovakia	2,356	2,356	2,362	2,365	2,367	2,369	2,356	2,369	2,362
Finland	3,660	3,677	3,694	3,712	3,729	3,743	3,660	3,743	3,702
Sweden	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
United Kingdom	40,382	40,713	41,018	41,283	41,571	41,909	40,382	41,909	41,146

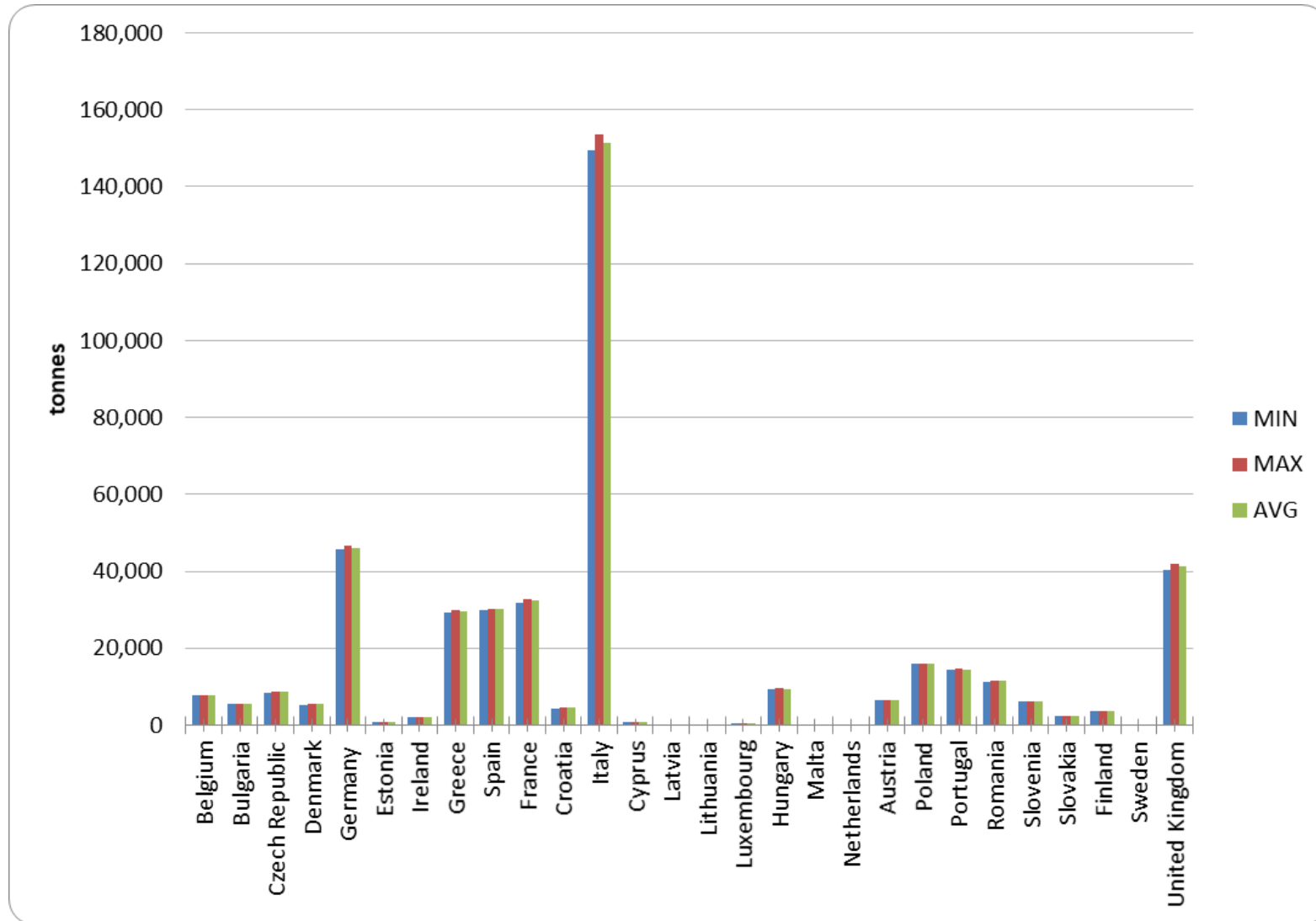


Figure 26 Tonnes of rotten grapes per country, 2010-2015

2.3 Orange

An orange is a citrus fruit mainly cultivated in the Mediterranean countries of Europe, due to its climate requirement. Oranges are a hybrid between pomelo and mandarin (34). There are many different varieties of orange, depending on the place of origin (35). Together with apples and bananas, oranges are the most consumed fresh fruit worldwide. The main AWCBs that occur during cultivation are pruning residues and leaves, Figure 27.



Figure 27 Pruning orange tree (36)

When oranges are processed many different types of AWCB occur due to several processing steps (37). Some steps in processing are mechanical, such as unloading, selection and filtration. They do not involve chemical agents or heat transfer. Others, like extraction, pasteurization and evaporation involve either chemical reactions or heat transfer, or both at the same time. Two main AWCB streams from these steps are in liquid and solid form. Mainly, oranges are processed for juice preparation as is shown in Figure 28 (38). Solid form from orange processing is mostly peel and pitted, Figure 29 (39).



Figure 28 Orange juice bottling (38)



Figure 29 AWCB from orange processing (39)

The flowchart (Figure 30) presents the value chain for orange and specific AWCB weight factors from Table 2.

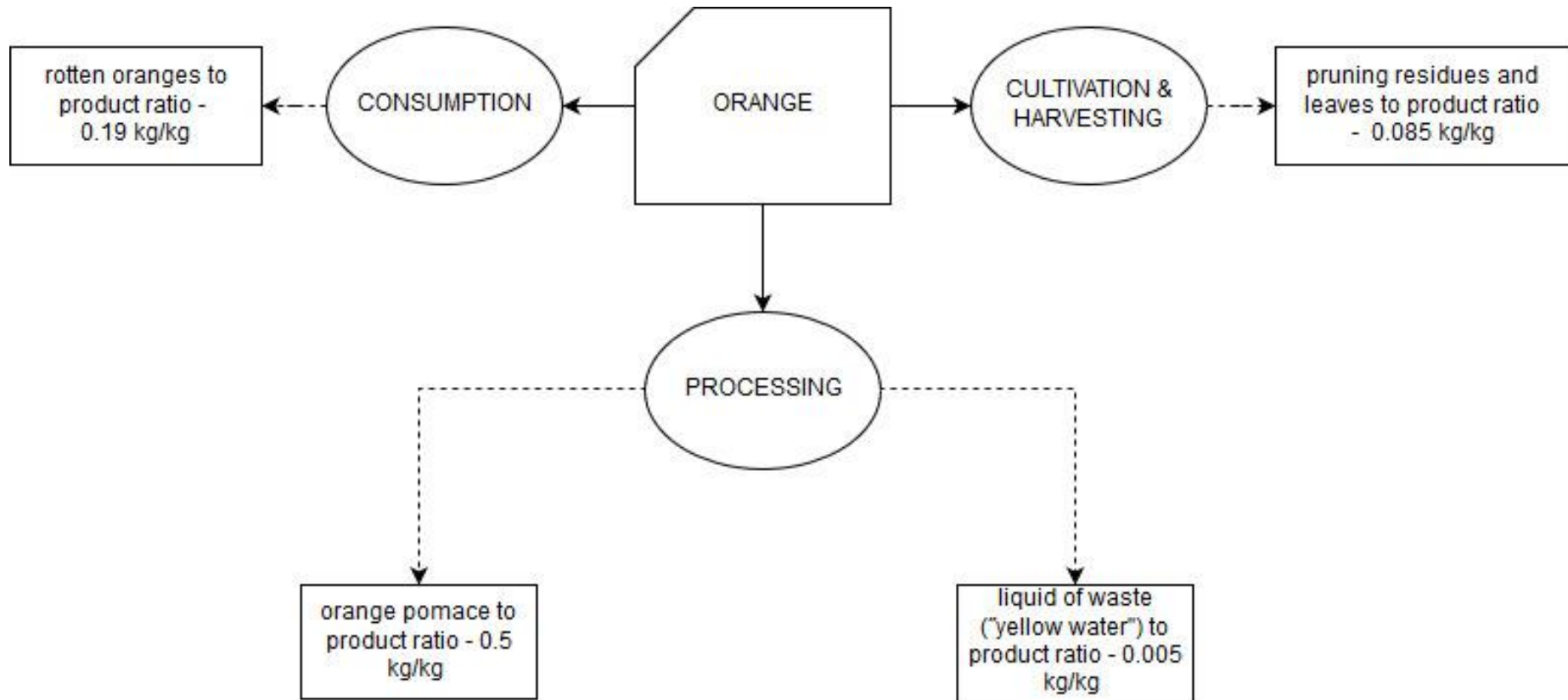


Figure 30 Orange AWCB value chain

Data for cultivated oranges is taken from EUROSTAT, and data for imported and exported oranges is taken from FAOSTAT. From specific consumption of oranges and population in the country, the quantity of consumed oranges is calculated. By using relation (I-VIII), the quantity of processed oranges is calculated for every country in each given year. Then the quantity of AWCB is calculated for every step and every year. Below is an example of the calculation for France in 2010:

PRD = 6,070 tonnes

IMP = 457,968 tonnes

EXP = 45,331 tonnes

CON = 432,692 tonnes

PRC = $(6,070 + 457,968) - (45,331 + 432,692)$ tonnes = 76,015 tonnes

The quantity of pruning residues is 0.085 kg per kg of harvested oranges: for France, it was 516 tonnes in 2010. The liquid AWCB that occurs in processing step takes 0.005 kg per kg of processed oranges, for France the quantity of liquid effluent was 380 tonnes in 2010. Orange pomace that occurred in France was 38,008 tonnes in 2010. The quantity of consumed oranges in France was 45,331 tonnes in 2010, of this amount 65,111 tonnes of oranges went mouldy (rotten). Results for other countries are shown in the tables and figures below.

Table 21 Tonnes of harvested oranges per country, 2010-2015 (27)

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	0	0	0	0	0	0	0	0	0
Bulgaria	0	0	0	0	0	0	0	0	0
Czech Republic	0	0	0	0	0	0	0	0	0
Denmark	0	0	0	0	0	0	0	0	0
Germany	0	0	0	0	0	0	0	0	0
Estonia	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0
Greece	955,440	844,560	791,610	953,570	859,380	880,920	791,610	955,440	880,913
Spain	3,120,050	2,818,890	2,955,590	3,547,800	3,494,470	3,098,320	2,818,890	3,547,800	3,172,520
France	6,070	5,980	4,210	4,120	3,660	3,670	3,660	6,070	4,618
Croatia	200	320	270	150	110	160	110	320	202
Italy	3,765,130	2,520,660	1,832,070	1,700,780	1,668,710	1,668,710	1,668,710	3,765,130	2,192,677
Cyprus	33,580	40,210	34,760	34,640	33,250	32,800	32,800	40,210	34,873
Latvia	0	0	0	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0	0	0
Luxembourg	0	0	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	0	0	0	0
Malta	1,280	1,470	1,030	820	1,120	1,190	820	1,470	1,152
Netherlands	0	0	0	0	0	0	0	0	0
Austria	0	0	0	0	0	0	0	0	0
Poland	0	0	0	0	0	0	0	0	0
Portugal	193,890	228,100	208,980	236,800	251,520	246,640	193,890	251,520	227,655
Romania	0	0	0	0	0	0	0	0	0
Slovenia	0	0	0	0	0	0	0	0	0
Slovakia	0	0	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0	0	0
Sweden	0	0	0	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0	0	0	0

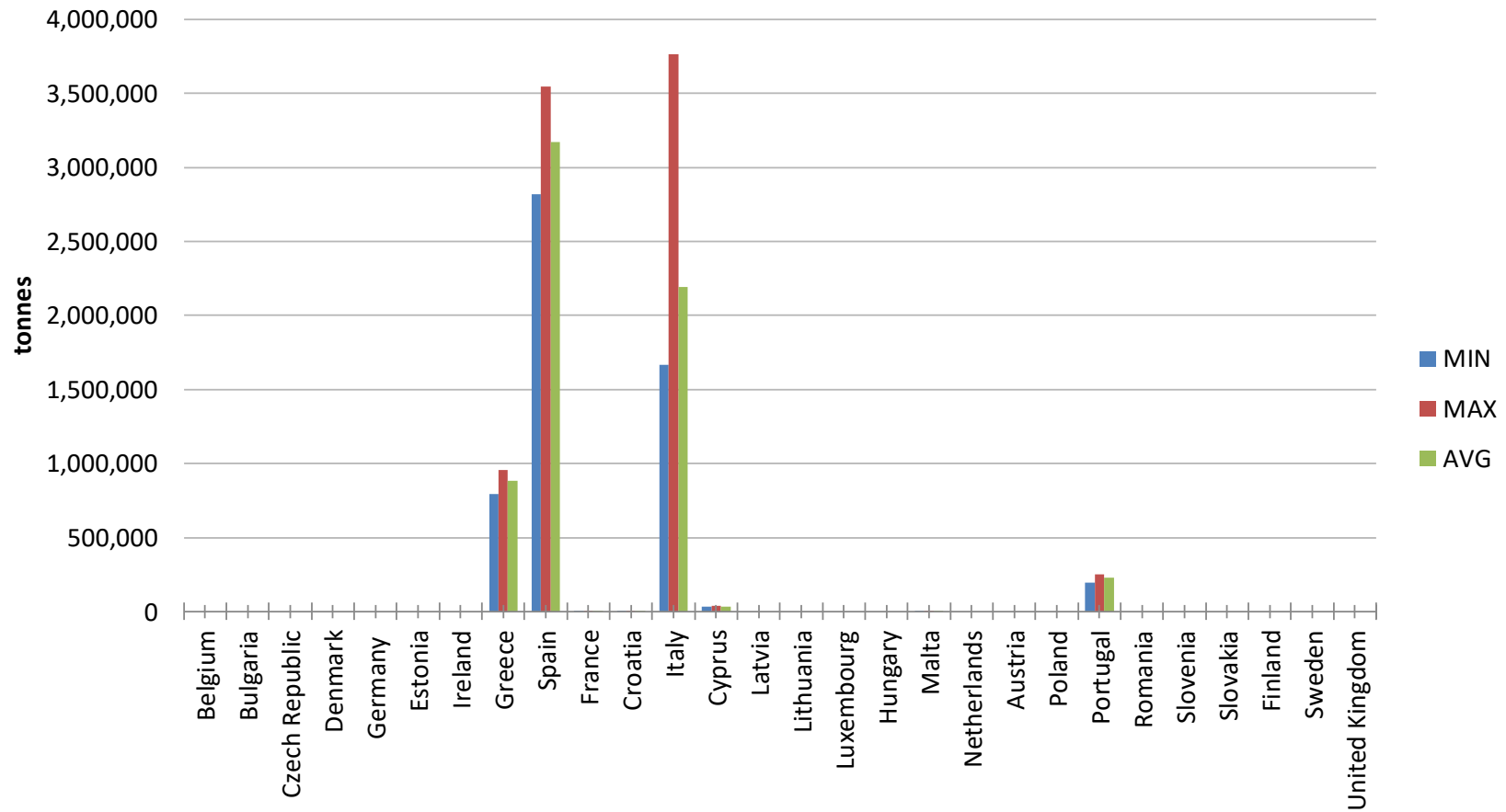


Figure 31 Tonnes of harvested oranges per country, 2010-2015

Table 22 Tonnes of orange pruning residues and leaves per country, 2010-2015

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	0	0	0	0	0	0	0	0	0
Bulgaria	0	0	0	0	0	0	0	0	0
Czech Republic	0	0	0	0	0	0	0	0	0
Denmark	0	0	0	0	0	0	0	0	0
Germany	0	0	0	0	0	0	0	0	0
Estonia	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0
Greece	81,212	71,788	67,287	81,053	73,047	74,878	67,287	81,212	74,878
Spain	265,204	239,606	251,225	301,563	297,030	263,357	239,606	301,563	269,664
France	516	508	358	350	311	312	311	516	393
Croatia	17	27	23	13	9	14	9	27	17
Italy	320,036	214,256	155,726	144,566	141,840	141,840	141,840	320,036	186,378
Cyprus	2,854	3,418	2,955	2,944	2,826	2,788	2,788	3,418	2,964
Latvia	0	0	0	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0	0	0
Luxembourg	0	0	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	0	0	0	0
Malta	109	125	88	70	95	101	70	125	98
Netherlands	0	0	0	0	0	0	0	0	0
Austria	0	0	0	0	0	0	0	0	0
Poland	0	0	0	0	0	0	0	0	0
Portugal	16,481	19,389	17,763	20,128	21,379	20,964	16,481	21,379	19,351
Romania	0	0	0	0	0	0	0	0	0
Slovenia	0	0	0	0	0	0	0	0	0
Slovakia	0	0	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0	0	0
Sweden	0	0	0	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0	0	0	0

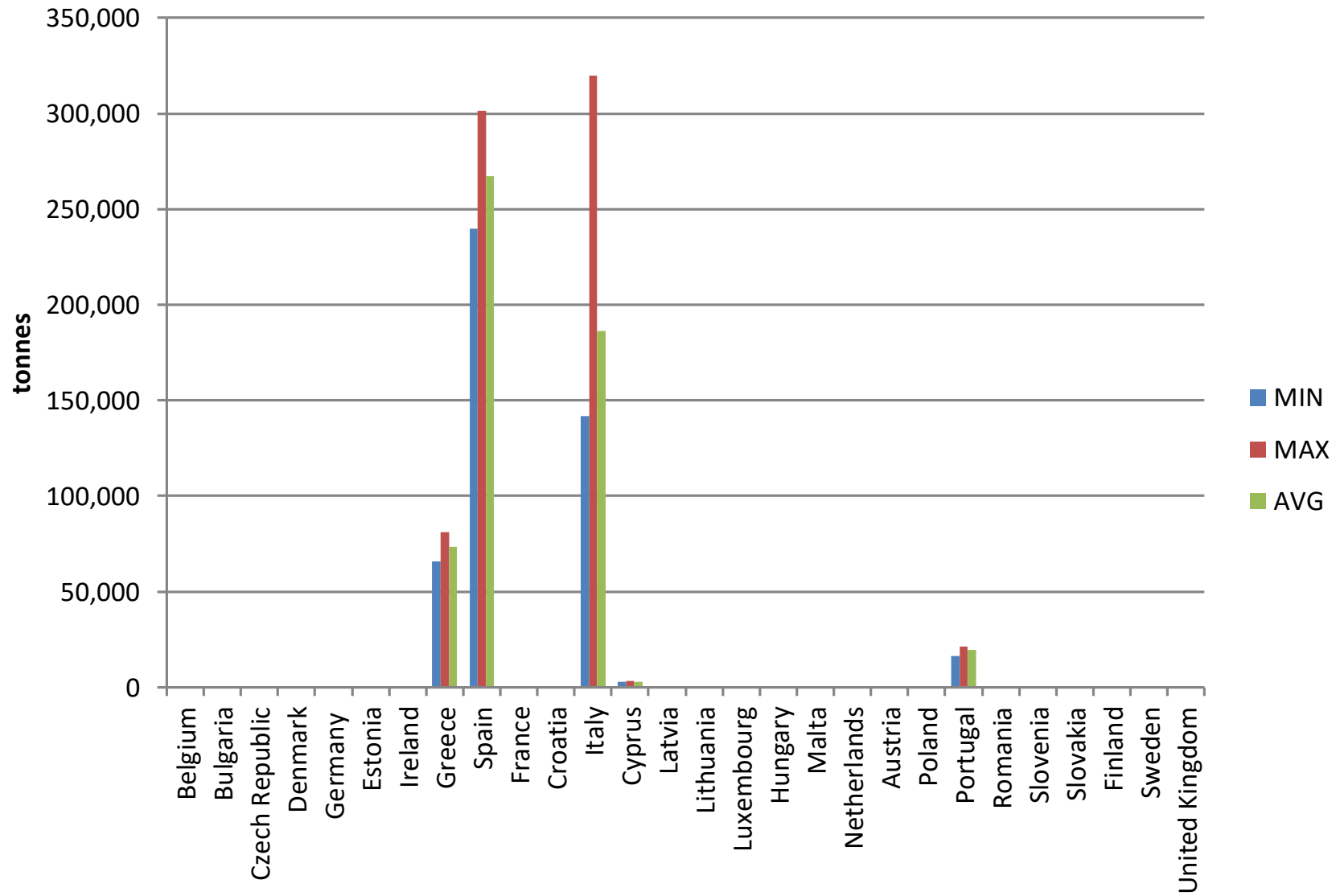


Figure 32 Tonnes of orange pruning residues and leaves per country, 2010-2015

Table 23 Tonnes of imported and exported oranges per country, 2010-2013 (28)

GEO/POPULATION	Trade	2010	2011	2012	2013
Belgium	Import	122,335	120,262	123,417	124,913
	Export	15,408	12,950	17,138	19,720
Bulgaria	Import	22,139	27,364	27,319	31,773
	Export	2,290	3,791	3,208	2,222
Czech Republic	Import	63,515	57,623	55,211	62,746
	Export	9,823	8,800	9,163	8,020
Denmark	Import	52,321	49,797	39,245	43,401
	Export	2,505	5,889	3,624	3,149
Germany	Import	504,658	483,734	513,677	558,216
	Export	33,282	35,668	35,752	44,682
Estonia	Import	4,709	4,266	4,467	5,903
	Export	89	12	76	2
Ireland	Import	25,498	22,028	24,969	27,720
	Export	1,436	256	459	1,263
Greece	Import	7,417	5,641	4,728	4,744
	Export	369,650	400,046	320,430	345,301
Spain	Import	137,010	115,409	121,465	126,150
	Export	1,341,089	1,526,624	1,757,063	1,811,409
France	Import	457,968	410,822	466,402	486,468
	Export	45,331	36,495	46,500	43,142
Croatia	Import	27,998	32,100	27,373	29,158
	Export	47	42	20	211
Italy	Import	94,383	144,901	184,031	220,634
	Export	175,993	135,424	114,115	125,226
Cyprus	Import	859	390	415	401
	Export	8,176	8,924	6,596	6,673
Latvia	Import	12,052	11,542	11,427	13,477
	Export	1,824	2,427	2,493	2,617
Lithuania	Import	27,892	27,667	36,847	41,635

	Export	18,002	17,626	25,088	26,468
Luxembourg	Import	4,058	4,232	4,694	4,594
	Export	104	142	141	116
Hungary	Import	24,675	31,044	24,608	26,347
	Export	2,321	2,043	1,193	460
Malta	Import	3,987	4,702	4,654	4,479
	Export	50	0	24	0
Netherlands	Import	537,870	461,732	475,520	490,967
	Export	238,141	192,257	222,725	204,297
Austria	Import	58,922	51,568	53,285	62,754
	Export	8,301	6,326	5,887	7,477
Poland	Import	129,236	128,655	136,247	167,559
	Export	9,543	10,186	12,863	14,614
Portugal	Import	83,902	67,487	61,986	80,245
	Export	30,351	37,698	100,736	77,850
Romania	Import	63,262	67,693	60,293	95,312
	Export	1,089	1,034	1,257	1,283
Slovenia	Import	20,106	18,289	16,373	20,161
	Export	13,468	11,329	10,519	9,237
Slovakia	Import	21,306	21,749	19,378	32,291
	Export	1,005	831	511	1,804
Finland	Import	23,134	27,851	28,816	27,392
	Export	6	38	49	66
Sweden	Import	99,390	96,777	84,691	96,590
	Export	590	807	601	249
United Kingdom	Import	275,647	284,649	281,974	290,866
	Export	35,219	38,750	30,513	43,760

Table 24 Tonnes of processed oranges per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	59,015	58,689	57,240	55,859	55,859	59,015	57,701
Bulgaria	18,290	22,025	22,572	28,021	18,290	28,021	22,727
Czech Republic	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	243,966	225,049	254,613	289,678	225,049	289,678	253,326
Estonia	1,687	1,329	1,476	2,997	1,329	2,997	1,872
Ireland	10,914	8,562	11,266	13,189	8,562	13,189	10,983
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spain	N/A	N/A	N/A	N/A	N/A	N/A	N/A
France	76,015	35,920	78,144	99,764	35,920	99,764	72,461
Croatia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy	2,979,157	1,823,697	1,195,195	1,085,934	1,085,934	2,979,157	1,770,996
Cyprus	24,133	29,493	26,338	26,117	24,133	29,493	26,520
Latvia	6,199	5,173	5,049	7,015	5,049	7,015	5,859
Lithuania	3,606	3,936	5,752	9,223	3,606	9,223	5,629
Luxembourg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hungary	2,325	9,030	3,551	6,069	2,325	9,030	5,244
Malta	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Austria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poland	24,636	23,312	28,225	57,789	23,312	57,789	33,490
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Romania	23,613	28,281	20,854	55,991	20,854	55,991	32,185
Slovenia	88	399	0	4,336	0	4,336	1,206
Slovakia	3,860	4,471	2,384	13,984	2,384	13,984	6,175
Finland	0	937	1,761	193	0	1,761	722
Sweden	55,179	51,999	39,805	51,715	39,805	55,179	49,675
United Kingdom	N/A	N/A	N/A	N/A	N/A	N/A	N/A

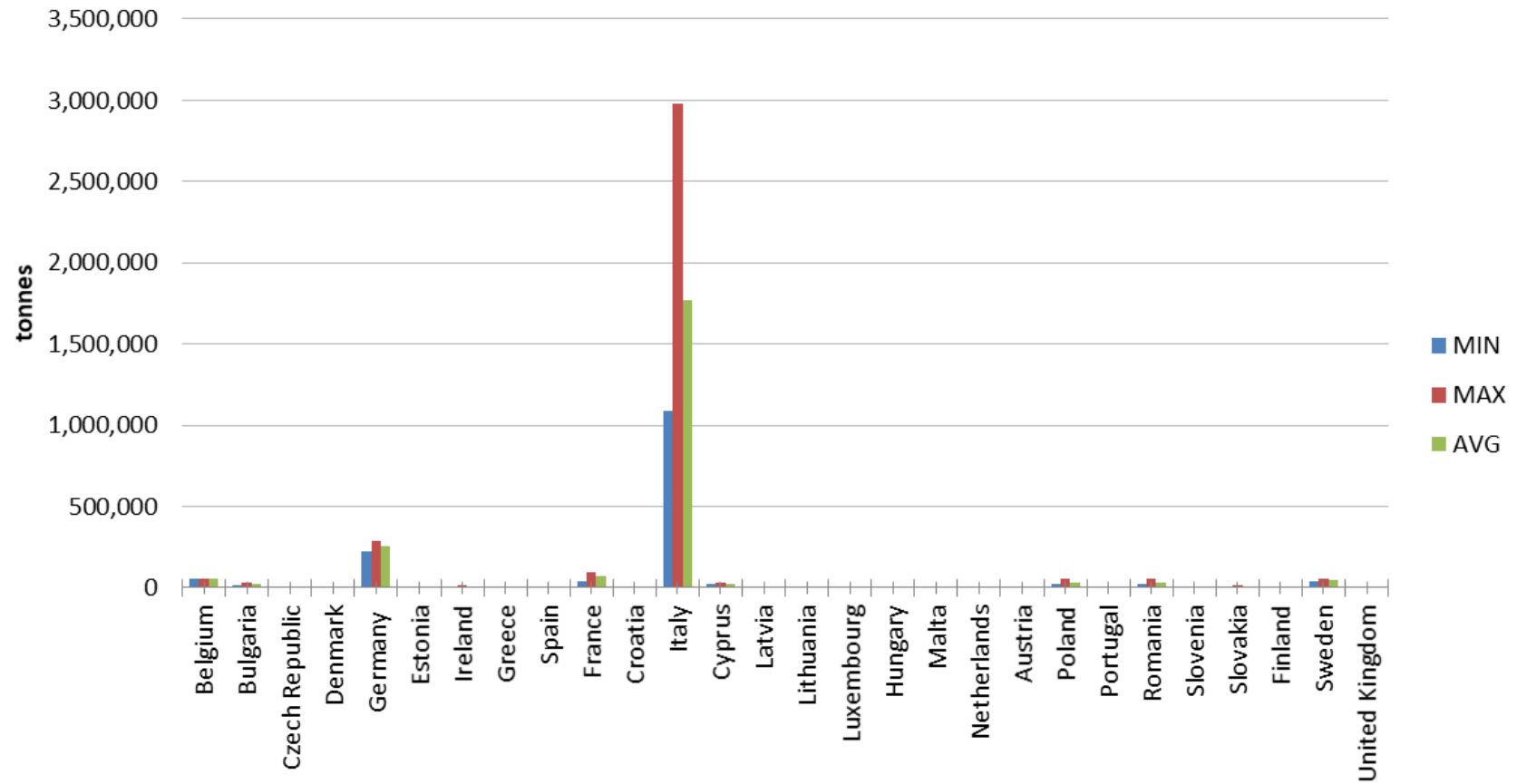


Figure 33 Tonnes of processed oranges per country, 2010-2013

Table 25 Tonnes of orange liquid effluent per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	295	293	286	279	279	295	289
Bulgaria	91	110	113	140	91	140	114
Czech Republic	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	1,220	1,125	1,273	1,448	1,125	1,448	1,267
Estonia	8	7	7	15	7	15	9
Ireland	55	43	56	66	43	66	55
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spain	N/A	N/A	N/A	N/A	N/A	N/A	N/A
France	380	180	391	499	180	499	362
Croatia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy	14,896	9,118	5,976	5,430	5,430	14,896	8,855
Cyprus	121	147	132	131	121	147	133
Latvia	31	26	25	35	25	35	29
Lithuania	18	20	29	46	18	46	28
Luxembourg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hungary	12	45	18	30	12	45	26
Malta	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Austria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poland	123	117	141	289	117	289	167
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Romania	118	141	104	280	104	280	161
Slovenia	0	2	0	22	0	22	6
Slovakia	19	22	12	70	12	70	31
Finland	0	5	9	1	0	9	4
Sweden	276	260	199	259	199	276	248
United Kingdom	N/A	N/A	N/A	N/A	N/A	N/A	N/A

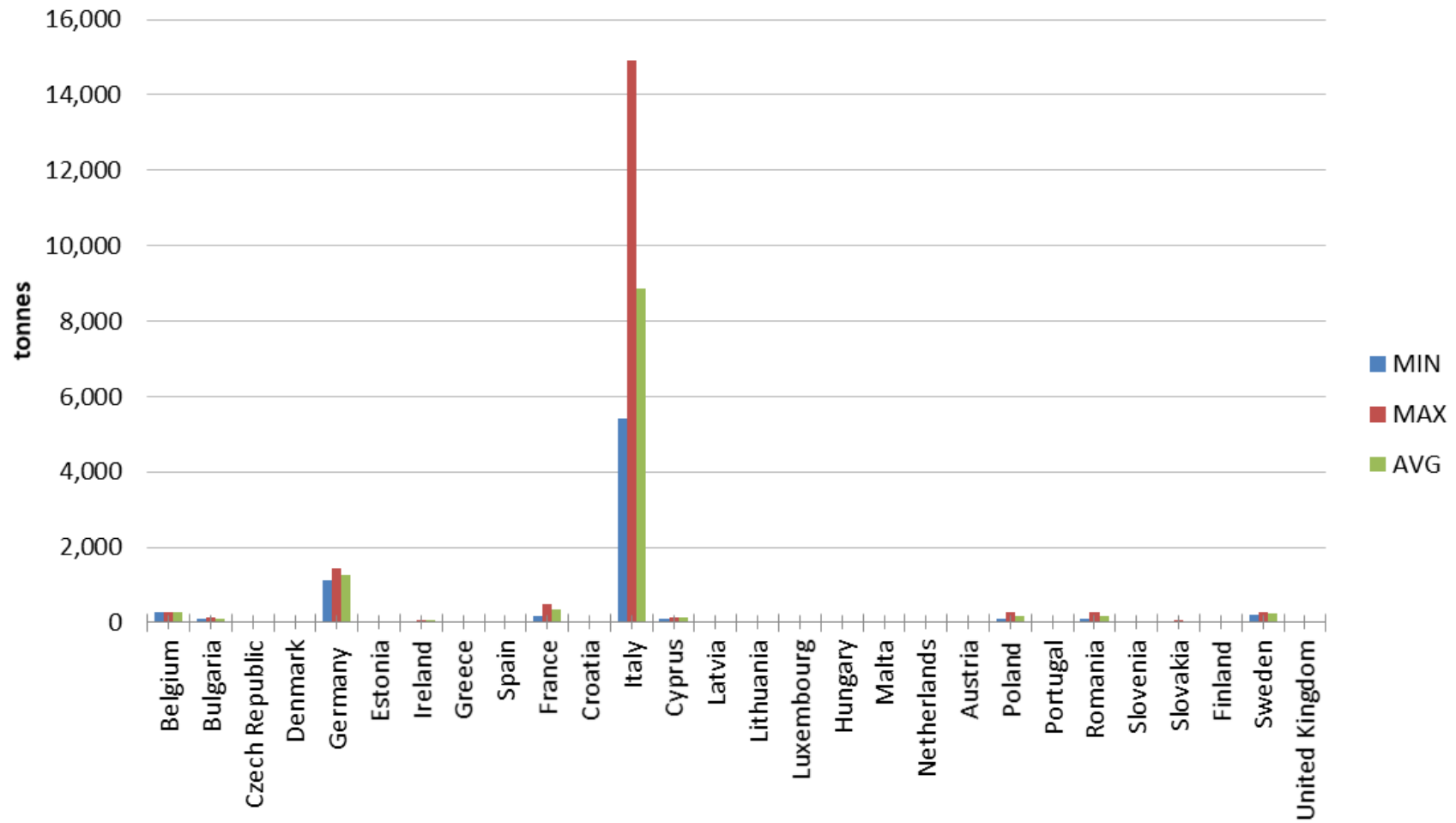


Figure 34 Tonnes of orange liquid waste per country, 2010-2013

Table 26 Tonnes of orange pomace per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	29,507	29,345	28,620	27,929	27,929	29,507	28,850
Bulgaria	9,145	11,013	11,286	14,011	9,145	14,011	11,364
Czech Republic	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	121,983	112,524	127,307	144,839	112,524	144,839	126,663
Estonia	843	664	738	1,498	664	1,498	936
Ireland	5,457	4,281	5,633	6,594	4,281	6,594	5,491
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spain	N/A	N/A	N/A	N/A	N/A	N/A	N/A
France	38,008	17,960	39,072	49,882	17,960	49,882	36,230
Croatia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy	1,489,579	911,849	597,597	542,967	542,967	1,489,579	885,498
Cyprus	12,067	14,746	13,169	13,058	12,067	14,746	13,260
Latvia	3,100	2,587	2,524	3,507	2,524	3,507	2,929
Lithuania	1,803	1,968	2,876	4,612	1,803	4,612	2,815
Luxembourg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hungary	1,163	4,515	1,776	3,035	1,163	4,515	2,622
Malta	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Austria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poland	12,318	11,656	14,112	28,894	11,656	28,894	16,745
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Romania	11,807	14,140	10,427	27,995	10,427	27,995	16,092
Slovenia	44	200	0	2,168	0	2,168	603
Slovakia	1,930	2,236	1,192	6,992	1,192	6,992	3,087
Finland	0	468	880	96	0	880	361
Sweden	27,590	26,000	19,903	25,857	19,903	27,590	24,837
United Kingdom	N/A	N/A	N/A	N/A	N/A	N/A	N/A

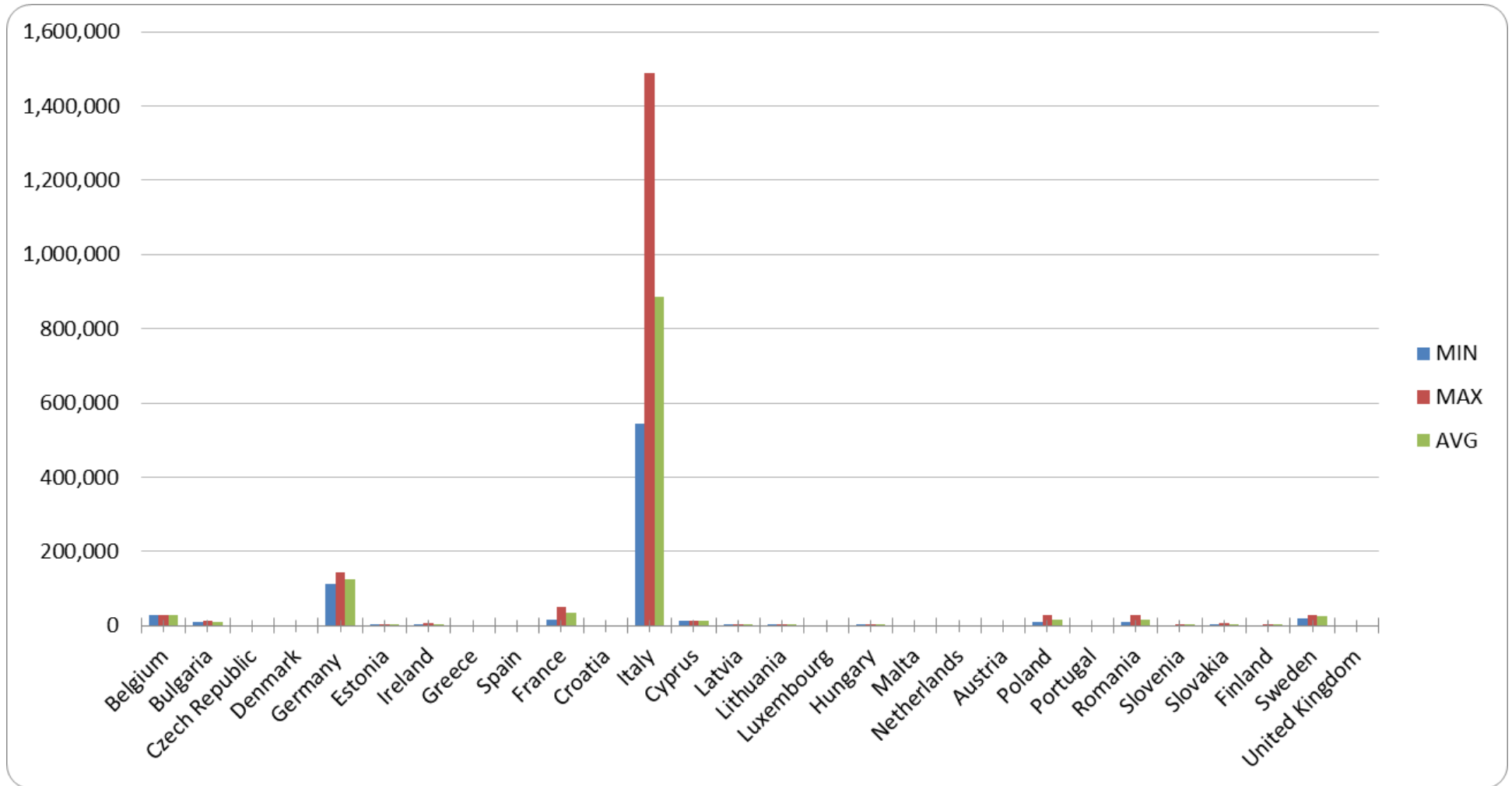


Figure 35 Tonnes of orange pomace per country, 2010-2013

Table 27 Consumption of fresh oranges (tonnes) per country, 2010-2015

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	47,912	48,623	49,039	49,334	49,419	49,669	47,912	49,669	48,999
Bulgaria	1,559	1,548	1,539	1,530	1,522	1,512	1,512	1,559	1,535
Czech Republic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	227,410	223,017	223,312	223,856	224,534	225,729	223,017	227,410	224,643
Estonia	2,933	2,925	2,915	2,904	2,895	2,893	2,893	2,933	2,911
Ireland	13,148	13,210	13,244	13,268	13,310	13,378	13,148	13,378	13,260
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spain	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
France	342,692	344,387	345,968	347,682	349,493	352,387	342,692	352,387	347,102
Croatia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy	704,363	706,440	706,791	710,254	723,314	723,468	704,363	723,468	712,438
Cyprus	2,130	2,183	2,241	2,251	2,231	2,202	2,130	2,251	2,206
Latvia	4,029	3,942	3,885	3,845	3,803	3,774	3,774	4,029	3,880
Lithuania	6,284	6,105	6,007	5,944	5,887	5,843	5,843	6,284	6,012
Luxembourg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hungary	20,029	19,971	19,864	19,818	19,755	19,711	19,711	20,029	19,858
Malta	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Austria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poland	95,057	95,157	95,159	95,156	95,045	95,014	95,014	95,159	95,098
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Romania	38,560	38,378	38,182	38,038	37,900	37,754	37,754	38,560	38,135
Slovenia	6,550	6,561	6,578	6,588	6,595	6,601	6,550	6,601	6,579
Slovakia	16,441	16,447	16,483	16,503	16,519	16,535	16,441	16,535	16,488
Finland	26,757	26,876	27,006	27,133	27,256	27,359	26,757	27,359	27,065
Sweden	43,621	43,971	44,285	44,626	45,042	45,520	43,621	45,520	44,511
United Kingdom	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

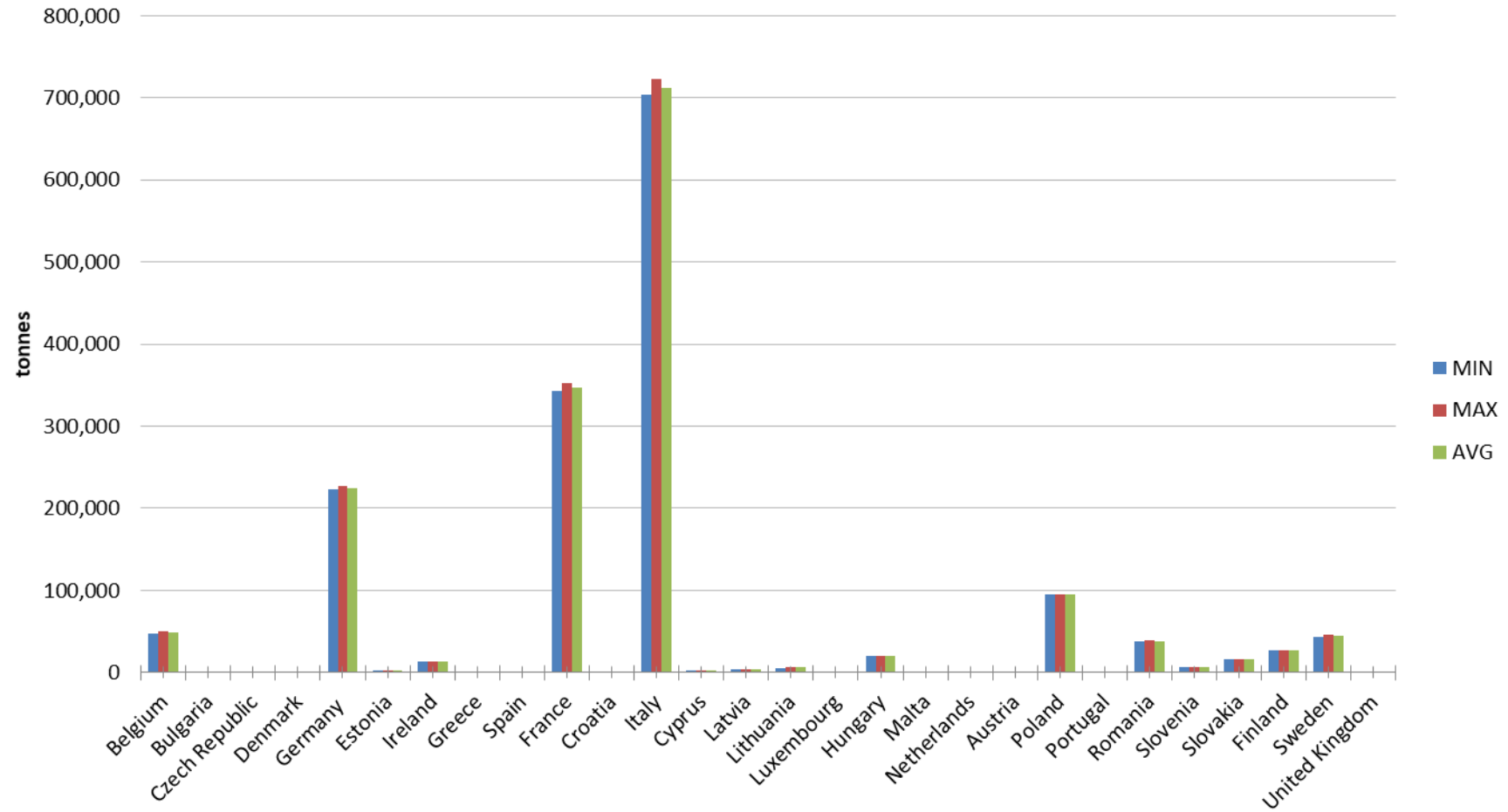
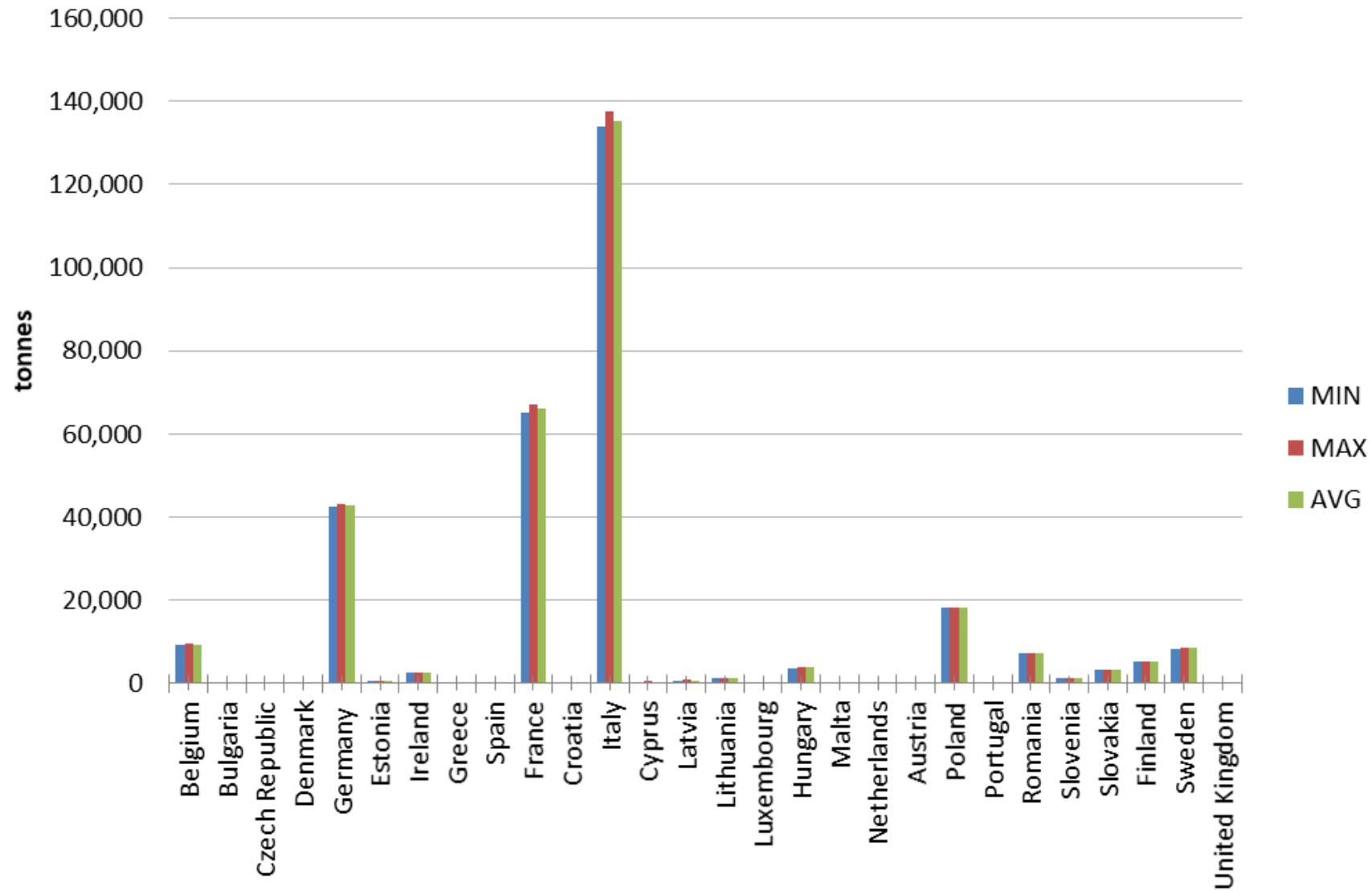


Figure 36 Consumption of fresh oranges (tonnes) per country, 2010-2015

Table 28 Tonnes of rotten oranges per country, 2010-2015

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	9,103	9,238	9,317	9,374	9,390	9,437	9,103	9,437	9,310
Bulgaria	296	294	292	291	289	287	287	296	292
Czech Republic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	43,208	42,373	42,429	42,533	42,661	42,889	42,373	43,208	42,682
Estonia	557	556	554	552	550	550	550	557	553
Ireland	2,498	2,510	2,516	2,521	2,529	2,542	2,498	2,542	2,519
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spain	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
France	65,111	65,434	65,734	66,060	66,404	66,954	65,111	66,954	65,949
Croatia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy	133,829	134,224	134,290	134,948	137,430	137,459	133,829	137,459	135,363
Cyprus	405	415	426	428	424	418	405	428	419
Latvia	766	749	738	731	723	717	717	766	737
Lithuania	1,194	1,160	1,141	1,129	1,119	1,110	1,110	1,194	1,142
Luxembourg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hungary	3,805	3,795	3,774	3,765	3,753	3,745	3,745	3,805	3,773
Malta	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Austria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poland	18,061	18,080	18,080	18,080	18,058	18,053	18,053	18,080	18,069
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Romania	7,326	7,292	7,255	7,227	7,201	7,173	7,173	7,326	7,246
Slovenia	1,245	1,247	1,250	1,252	1,253	1,254	1,245	1,254	1,250
Slovakia	3,124	3,125	3,132	3,136	3,139	3,142	3,124	3,142	3,133
Finland	5,084	5,107	5,131	5,155	5,179	5,198	5,084	5,198	5,142
Sweden	8,288	8,354	8,414	8,479	8,558	8,649	8,288	8,649	8,457
United Kingdom	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Figure 37 Tonnes of rotten oranges per country, 2010-2015



2.4 Peach

Peaches are mainly cultivated for fresh consumption or juice production. Based on place of origin (mostly US, China or Europe) there exist several varieties of peach (40) shown in Figure 38.



Figure 38 Different cultivars of peaches (40)

During cultivation stage, the main AWCB that occurs are pruning residues and leaves (41), Figure 39.



Figure 39 Peach pruning (42)

During the processing stage, the main AWCB source is effluent, shown in Figure 40 (43).



Figure 40 Wastewater from peaches processing (43)

The peach kernel is non-edible part of peach, Figure 41 (44).



Figure 41 Peach kernel (44)

Flowchart in Figure 42 presents AWCB value chain for peaches and specific AWCB weight factors from Table 2.

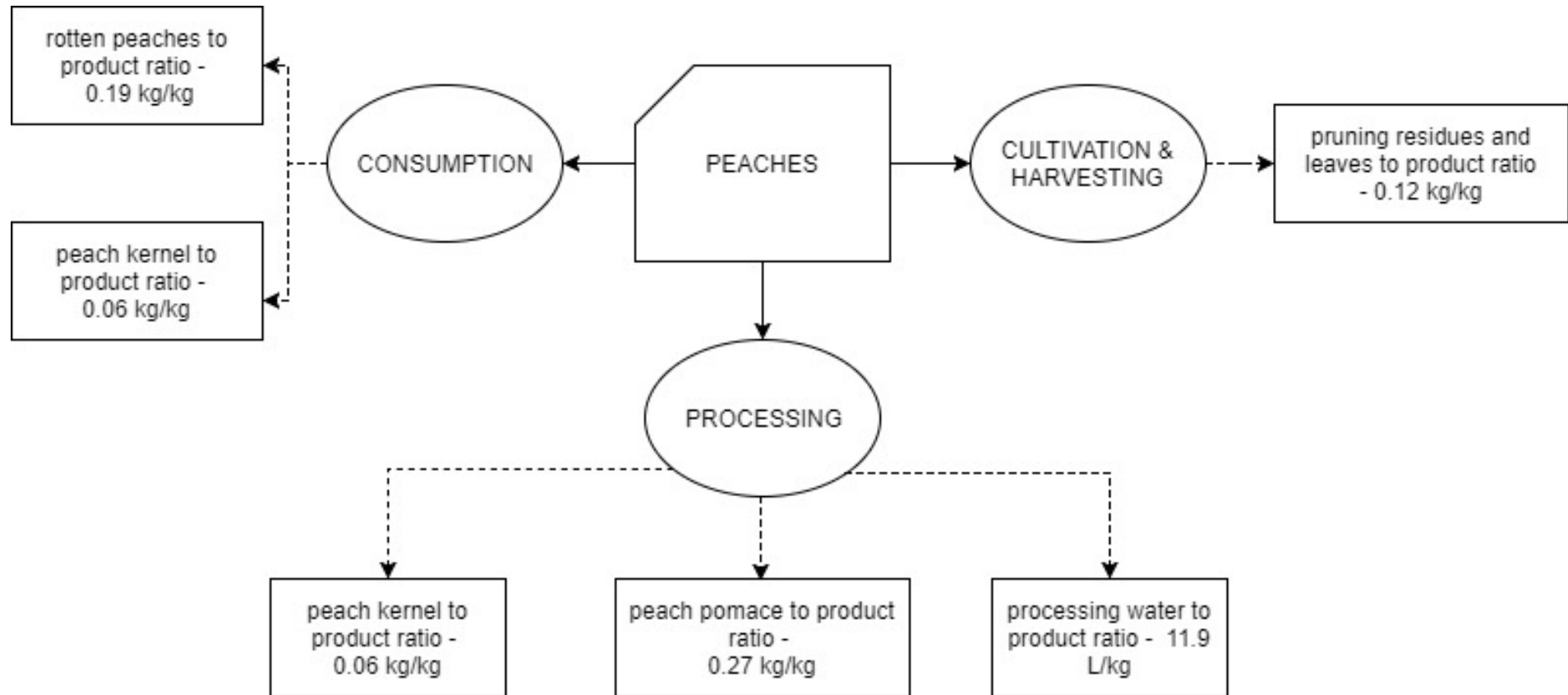


Figure 42 Peaches AWCB value chain

Data for cultivated peaches is taken from EUROSTAT, and data for imported and exported peaches is taken from FAOSTAT. From specific consumption of peaches and population in the country, the quantity of consumed peaches is calculated. By using relation (I-VIII), the quantity of processed peaches is calculated for every country in each given year. Then the quantity of AWCB is calculated for every step and every year. Here an example of calculation for Italy in 2010:

PRD = 1,017,550 tonnes

IMP = 59,484 tonnes

EXP = 359,598 tonnes

CON = 375,266 tonnes

PRC = (1,017,550 + 59,484) - (359,598 + 375,266) tonnes = 342,170 tonnes

The quantity of pruning residues is 0.12 kg per kg of harvested peaches: for Italy, it was 122,106 tonnes in 2010. Processing wastewater that occurs in the processing step is almost 12L/kg of processed peach. For Italy, the quantity of wastewater was 4,071,829 m³ in 2010. The quantity of peach kernel from processing for Italy was 20,503 tonnes in 2010. The quantity of peach pomace from Italian processing facilities was 102,651 tonnes in 2010. The quantity of consumed peaches for Italy was 375,266 tonnes in 2010. 71,300 tonnes of it went mouldy (rotten). Kernel from peaches consumption takes 0.06 kg per kg of peach mass, and for Italy, it was 22,516 tonnes in 2010. Results for other countries are shown in the tables and figures below.

Table 29 Tonnes of harvested peaches per country, 2010-2015 (27)

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	0	0	0	0	0	0	0	0	0
Bulgaria	24,400	28,400	25,210	37,310	27,930	34,370	24,400	37,310	29,603
Czech Republic	1,800	2,090	1,560	2,290	1,070	1,600	1,070	2,290	1,735
Denmark	0	0	0	0	0	0	0	0	0
Germany	0	0	0	0	0	0	0	0	0
Estonia	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0
Greece	639,390	591,700	655,810	461,630	829,090	631,420	461,630	829,090	634,840
Spain	757,340	802,390	736,570	820,140	931,070	964,110	736,570	964,110	835,270
France	140,640	133,730	127,500	112,820	121,480	114,720	112,820	140,640	125,148
Croatia	5,150	7,810	3,520	3,110	3,190	3,660	3,110	7,810	4,407
Italy	1,017,550	1,025,900	949,620	917,960	859,950	921,150	859,950	1,025,900	948,688
Cyprus	2,120	2,210	2,110	2,020	2,200	2,290	2,020	2,290	2,158
Latvia	0	0	0	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0	0	0
Luxembourg	0	0	0	0	0	0	0	0	0
Hungary	52,910	41,730	16,260	43,920	38,730	37,370	16,260	52,910	38,487
Malta	810	1,440	660	550	600	690	550	1,440	792
Netherlands	0	0	0	0	0	0	0	0	0
Austria	2,880	3,340	2,660	2,860	2,950	2,920	2,660	3,340	2,935
Poland	9,300	8,700	9,100	10,400	10,000	9,900	8,700	10,400	9,567
Portugal	25,080	26,240	22,920	17,360	31,200	35,640	17,360	35,640	26,407
Romania	10,570	20,880	16,430	17,990	23,340	20,500	10,570	23,340	18,285
Slovenia	6,930	7,630	5,550	0	4,170	5,550	0	7,630	4,972
Slovakia	1,900	1,750	2,010	2,370	1,970	2,110	1,750	2,370	2,018
Finland	0	0	0	0	0	0	0	0	0
Sweden	0	0	0	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0	0	0	0

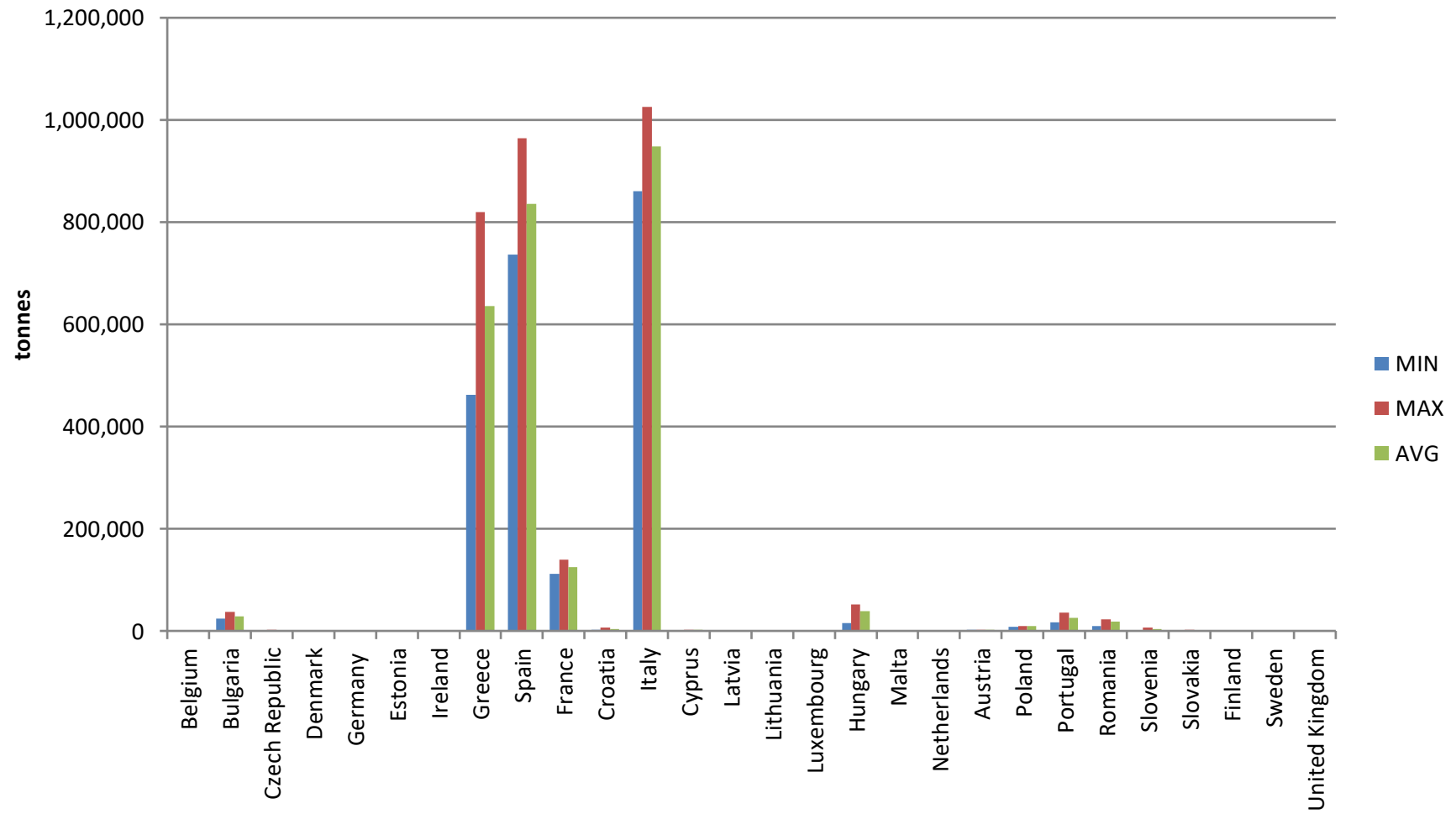


Figure 43 Tonnes of harvested peaches per country, 2010-2015

Table 30 Tonnes of peach pruning residues and leaves per country, 2010-2015

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	0	0	0	0	0	0	0	0	0
Bulgaria	2,928	3,408	3,025	4,477	3,352	4,124	2,928	4,477	3,552
Czech Republic	216	251	187	275	128	192	128	275	208
Denmark	0	0	0	0	0	0	0	0	0
Germany	0	0	0	0	0	0	0	0	0
Estonia	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0
Greece	76,727	71,004	78,697	55,396	99,491	75,770	55,396	99,491	76,181
Spain	90,881	96,287	88,388	98,417	111,728	115,693	88,388	115,693	100,232
France	16,877	16,048	15,300	13,538	14,578	13,766	13,538	16,877	15,018
Croatia	618	937	422	373	383	439	373	937	529
Italy	122,106	123,108	113,954	110,155	103,194	110,538	103,194	123,108	113,843
Cyprus	254	265	253	242	264	275	242	275	259
Latvia	0	0	0	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0	0	0
Luxembourg	0	0	0	0	0	0	0	0	0
Hungary	6,349	5,008	1,951	5,270	4,648	4,484	1,951	6,349	4,618
Malta	97	173	79	66	72	83	66	173	95
Netherlands	0	0	0	0	0	0	0	0	0
Austria	346	401	319	343	354	350	319	401	352
Poland	1,116	1,044	1,092	1,248	1,200	1,188	1,044	1,248	1,148
Portugal	3,010	3,149	2,750	2,083	3,744	4,277	2,083	4,277	3,169
Romania	1,268	2,506	1,972	2,159	2,801	2,460	1,268	2,801	2,194
Slovenia	832	916	666	0	500	666	0	916	597
Slovakia	228	210	241	284	236	253	210	284	242
Finland	0	0	0	0	0	0	0	0	0
Sweden	0	0	0	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0	0	0	0

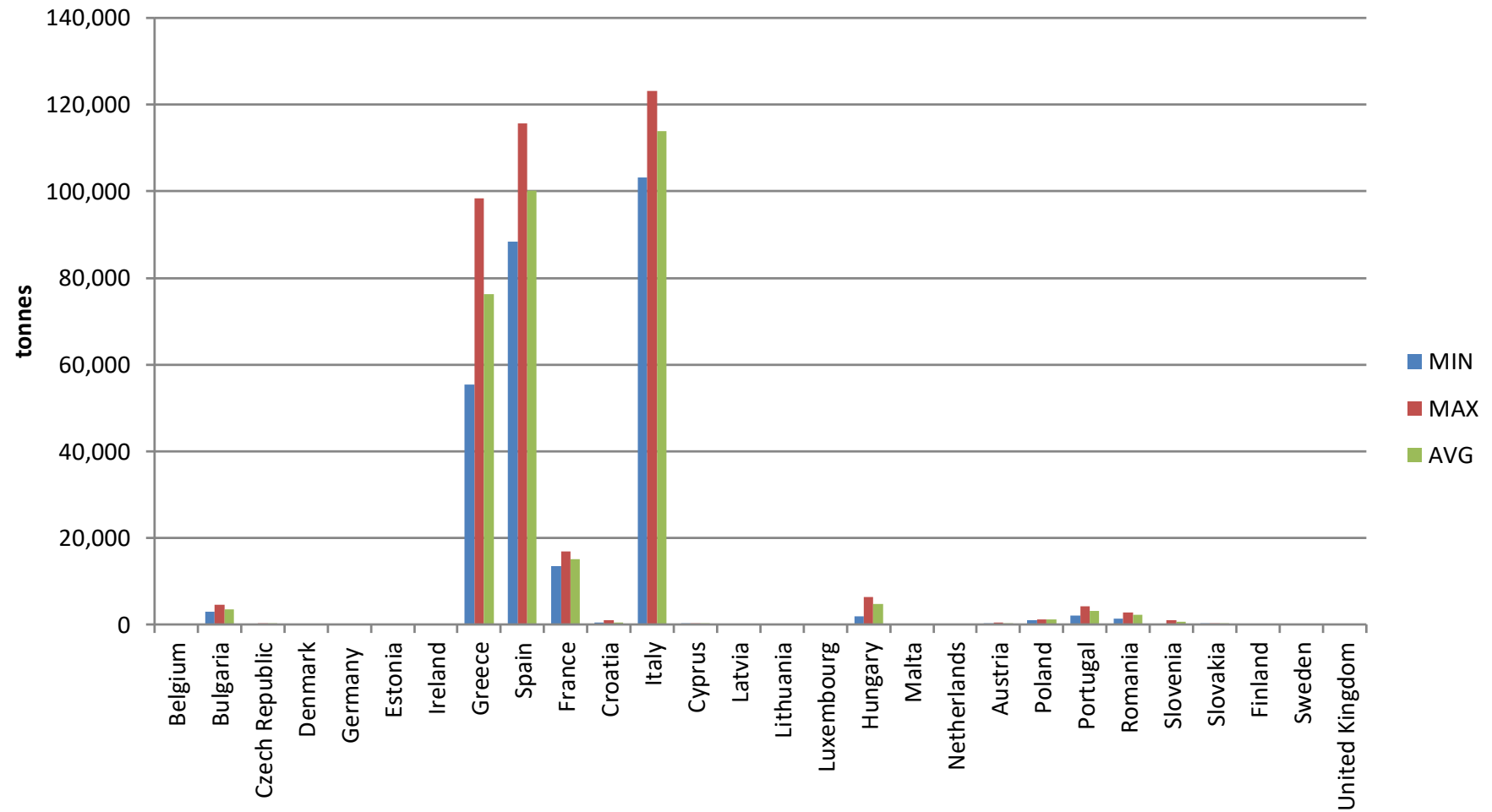


Figure 44 Tonnes of peach pruning residues and leaves per country, 2010-2015

Table 31 Tonnes of imported and exported peaches per country, 2010-2013 (28)

GEO/POPULATION	Trade	2010	2011	2012	2013
Belgium	Import	53,733	55,440	74,148	75,223
	Export	21,551	24,949	29,680	40,429
Bulgaria	Import	6,424	11,296	16,673	9,473
	Export	2,642	2,571	3,964	3,317
Czech Republic	Import	35,303	34,672	31,233	26,878
	Export	3,556	3,734	3,155	2,865
Denmark	Import	16,848	19,187	18,482	15,333
	Export	624	1,317	1,895	1,409
Germany	Import	275,400	271,080	279,192	287,606
	Export	19,530	17,922	15,341	15,407
Estonia	Import	2,739	2,870	3,247	2,240
	Export	13	406	1	0
Ireland	Import	3,819	2,734	4,124	3,472
	Export	200	40	53	104
Greece	Import	3,671	3,531	1,172	1,236
	Export	110,576	103,695	155,263	112,875
Spain	Import	16,937	12,382	14,670	7,884
	Export	585,292	657,976	647,501	749,817
France	Import	115,827	115,641	129,113	147,837
	Export	48,358	43,693	47,369	44,284
Croatia	Import	7,379	7,589	11,024	8,321
	Export	0	28	6	137
Italy	Import	59,484	74,147	55,707	72,859
	Export	359,598	349,120	369,320	295,888
Cyprus	Import	1,569	1,716	1,251	1,448
	Export	0	0	0	9
Latvia	Import	7,785	6,258	6,749	4,952
	Export	3,553	2,842	3,639	1,856
Lithuania	Import	25,699	29,174	36,073	32,281

	Export	23,718	24,459	32,280	27,270
Luxembourg	Import	1,572	1,537	1,606	1,587
	Export	45	54	42	50
Hungary	Import	4,724	4,494	6,464	4,477
	Export	748	398	173	57
Malta	Import	743	1,133	1,308	975
	Export	19	0	0	0
Netherlands	Import	74,949	52,608	52,752	49,704
	Export	20,393	21,938	19,562	23,669
Austria	Import	30,341	28,725	31,106	31,615
	Export	2,965	2,698	2,483	2,328
Poland	Import	92,507	99,512	108,240	92,588
	Export	23,432	23,771	35,642	20,865
Portugal	Import	33,143	37,075	40,815	49,876
	Export	4,174	3,910	3,236	6,296
Romania	Import	14,542	16,350	38,065	26,218
	Export	544	350	2,046	1,414
Slovenia	Import	10,971	10,275	11,136	10,507
	Export	5,589	6,806	10,544	2,638
Slovakia	Import	11,779	12,346	10,643	9,870
	Export	1,443	1,299	1,010	1,086
Finland	Import	6,814	7,363	8,163	7,081
	Export	0	0	5	0
Sweden	Import	22,069	23,460	24,914	24,553
	Export	61	87	51	39
United Kingdom	Import	63,514	70,270	80,638	87,337
	Export	1,367	970	820	1,377

Table 32 Tonnes of processed peaches per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	14,188	12,230	26,051	16,266	12,230	26,051	17,183
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	12,623	12,055	8,627	5,271	5,271	12,623	9,644
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	51,364	52,603	63,031	70,890	51,364	70,890	59,472
Estonia	1,846	1,586	2,371	1,369	1,369	2,371	1,793
Ireland	1,208	271	1,642	935	0	1,642	1,014
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spain	114,606	82,129	28,830	3,442	3,442	114,606	57,252
France	15,426	12,041	14,719	20,884	12,041	20,884	15,767
Croatia	1,772	4,646	3,848	639	639	4,646	2,726
Italy	342,170	374,555	259,448	316,527	259,448	374,555	323,175
Cyprus	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Latvia	2,324	1,549	1,270	1,275	1,270	2,324	1,604
Lithuania	0	2,273	1,390	2,633	0	2,633	1,574
Luxembourg	272	203	252	194	194	272	230
Hungary	27,844	16,867	0	19,604	0	27,844	16,079
Malta	0	789	173	0	0	789	240
Netherlands	24,721	690	3,075	0	0	24,721	7,121
Austria	0	0	0	0	0	0	0
Poland	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Portugal	0	1,255	2,516	3,260	0	3,260	1,758
Romania	6,303	18,701	34,363	24,776	6,303	34,363	21,036
Slovenia	9,651	8,434	3,470	5,193	3,470	9,651	6,687
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	5,744	6,288	7,078	5,996	5,744	7,078	6,276
Sweden	2,393	3,600	4,949	4,447	2,393	4,949	3,847
United Kingdom	0	0	0	0	0	0	0

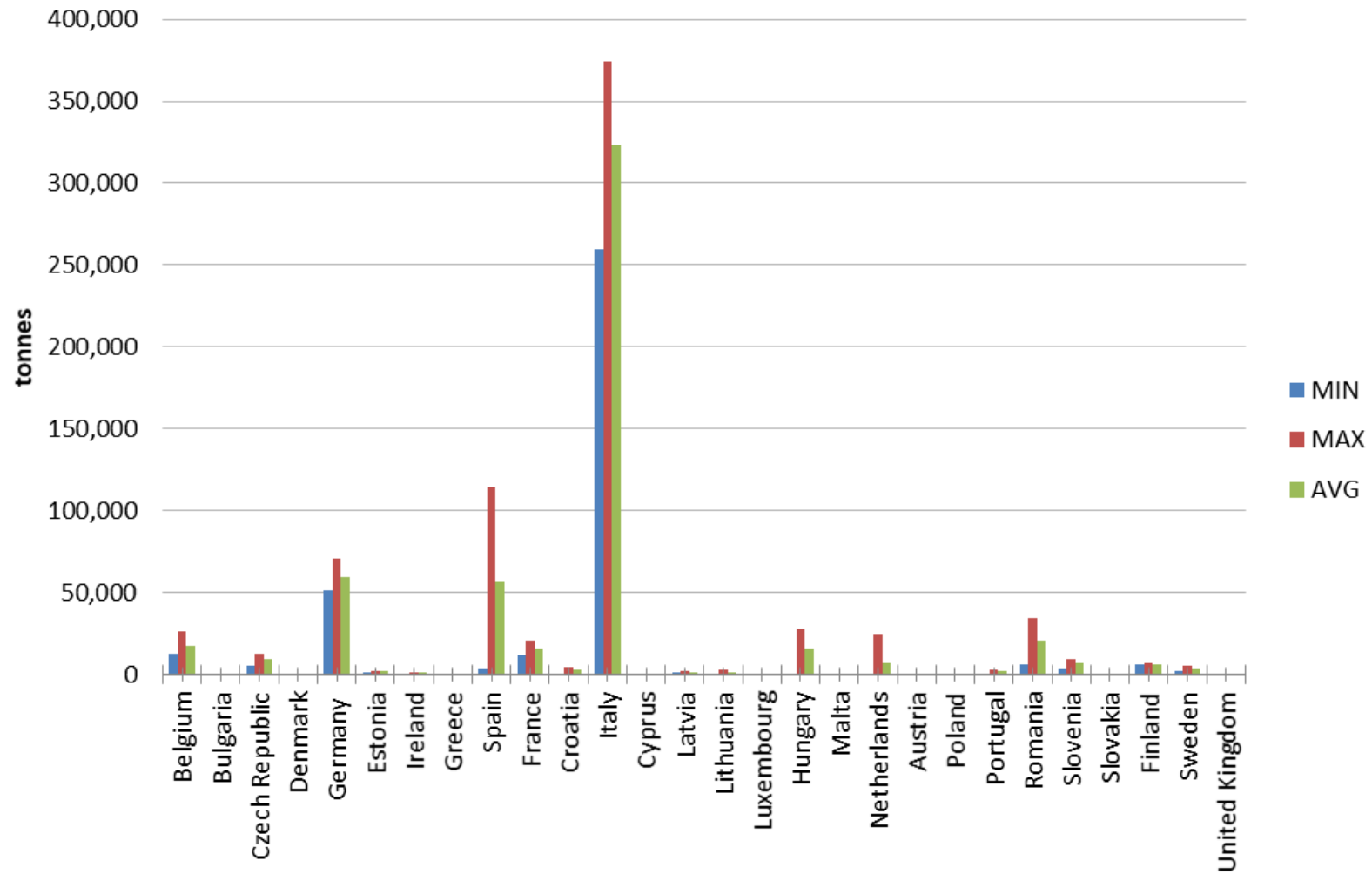


Figure 45 Tonnes of processed peaches per country, 2010-2013

Table 33 Volume of peach processing water in m³ per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	168,834	145,536	310,002	193,562	145,536	310,002	204,483
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	150,212	143,449	102,663	62,722	62,722	150,212	114,761
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	611,236	625,974	750,072	843,587	611,236	843,587	707,717
Estonia	21,968	18,878	28,219	16,287	16,287	28,219	21,338
Ireland	14,373	3,230	19,542	11,123	3,230	19,542	12,067
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spain	1,363,816	977,329	343,075	40,964	40,964	1,363,816	681,296
France	183,565	143,293	175,151	248,519	143,293	248,519	187,632
Croatia	21,085	55,292	45,792	7,600	7,600	55,292	32,442
Italy	4,071,829	4,457,203	3,087,428	3,766,667	3,087,428	4,457,203	3,845,782
Cyprus	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Latvia	27,650	18,431	15,109	15,167	15,109	27,650	19,089
Lithuania	0	27,048	16,542	31,338	0	31,338	18,732
Luxembourg	3,235	2,420	2,997	2,313	2,313	3,235	2,741
Hungary	331,349	200,722	0	233,293	0	331,349	191,341
Malta	0	9,384	2,053	0	0	9,384	2,859
Netherlands	294,180	8,206	36,597	0	0	294,180	84,746
Austria	0	0	0	0	0	0	0
Poland	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Portugal	0	14,935	29,938	38,793	0	38,793	20,916
Romania	75,003	222,540	408,915	294,834	75,003	408,915	250,323
Slovenia	114,846	100,362	41,291	61,791	41,291	114,846	79,573
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	68,350	74,827	84,225	71,348	68,350	84,225	74,688
Sweden	28,472	42,844	58,893	52,915	28,472	58,893	45,781
United Kingdom	0	0	0	0	0	0	0

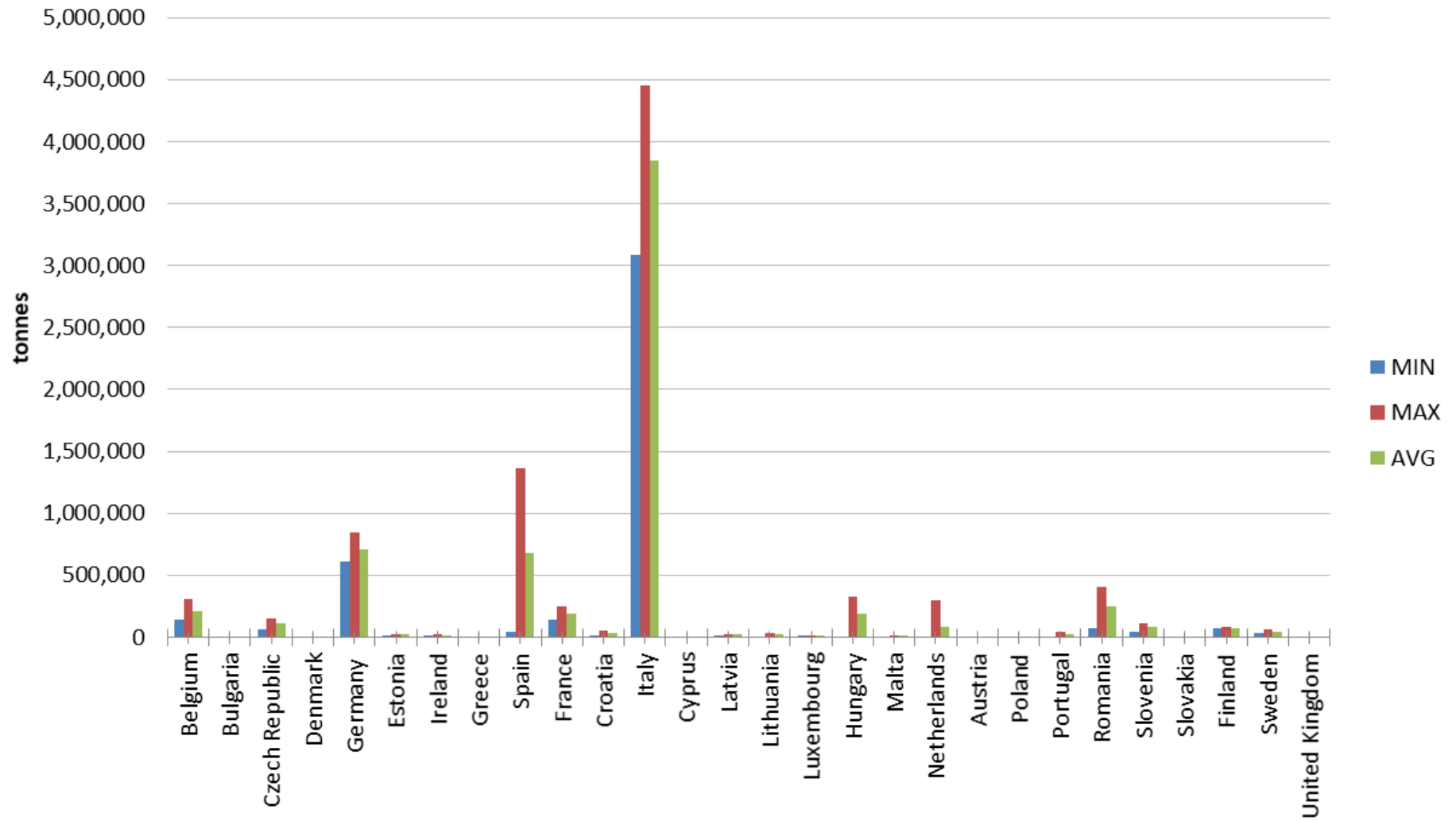


Figure 46 Volume of peach processing water in m³ per country, 2010-2013

Table 34 Tonnes of peach kernel from processing per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	851	734	1,563	976	734	1,563	1,031
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	757	723	518	316	316	757	579
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Estonia	111	95	142	82	82	142	108
Ireland	72	16	99	56	16	99	61
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spain	6,876	4,928	1,730	207	207	6,876	3,435
France	926	722	883	1,253	722	1,253	946
Croatia	106	279	231	38	38	279	164
Italy	20,530	22,473	15,567	18,992	15,567	22,473	19,390
Cyprus	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Latvia	139	93	76	76	76	139	96
Lithuania	0	136	83	158	0	158	94
Luxembourg	16	12	15	12	12	16	14
Hungary	1,671	1,012	0	1,176	0	1,671	965
Malta	0	47	10	0	0	47	14
Netherlands	1,483	41	185	0	0	1,483	427
Austria	0	0	0	0	0	0	0
Poland	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Portugal	0	75	151	196	0	196	105
Romania	378	1,122	2,062	1,487	378	2,062	1,262
Slovenia	579	506	208	312	208	579	401
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	345	377	425	360	345	425	377
Sweden	144	216	297	267	144	297	231
United Kingdom	0	0	0	0	0	0	0

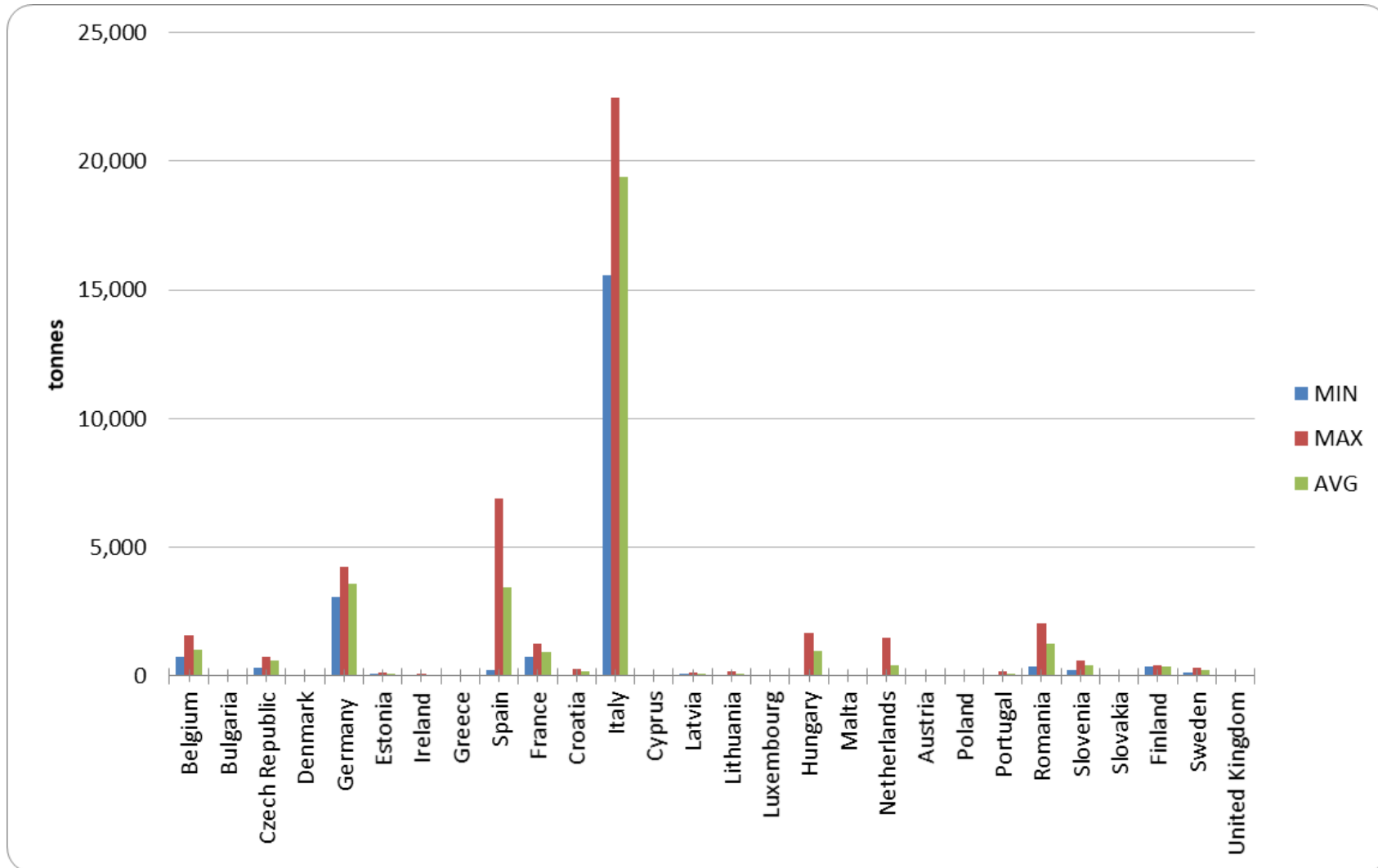


Figure 47 Tonnes of peach kernel from processing per country, 2010-2013

Table 35 Tonnes of peach pomace per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	4,256	3,669	7,815	4,880	3,669	7,815	5,155
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	3,787	3,616	2,588	1,581	1,581	3,787	2,893
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	15,409	15,781	18,909	21,267	15,409	21,267	17,842
Estonia	554	476	711	411	411	711	538
Ireland	362	81	493	280	81	493	304
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spain	34,382	24,639	8,649	1,033	1,033	34,382	17,176
France	4,628	3,612	4,416	6,265	3,612	6,265	4,730
Croatia	532	1,394	1,154	192	192	1,394	818
Italy	102,651	112,366	77,834	94,958	77,834	112,366	96,952
Cyprus	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Latvia	697	465	381	382	381	697	481
Lithuania	0	682	417	790	0	790	472
Luxembourg	82	61	76	58	58	82	69
Hungary	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	0	237	52	0	0	237	72
Netherlands	7,416	207	923	0	0	7,416	2,136
Austria	0	0	0	0	0	0	0
Poland	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Portugal	0	377	755	978	0	978	527
Romania	1,891	5,610	10,309	7,433	1,891	10,309	6,311
Slovenia	2,895	2,530	1,041	1,558	1,041	2,895	2,006
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	1,723	1,886	2,123	1,799	1,723	2,123	1,883
Sweden	718	1,080	1,485	1,334	718	1,485	1,154
United Kingdom	0	0	0	0	0	0	0

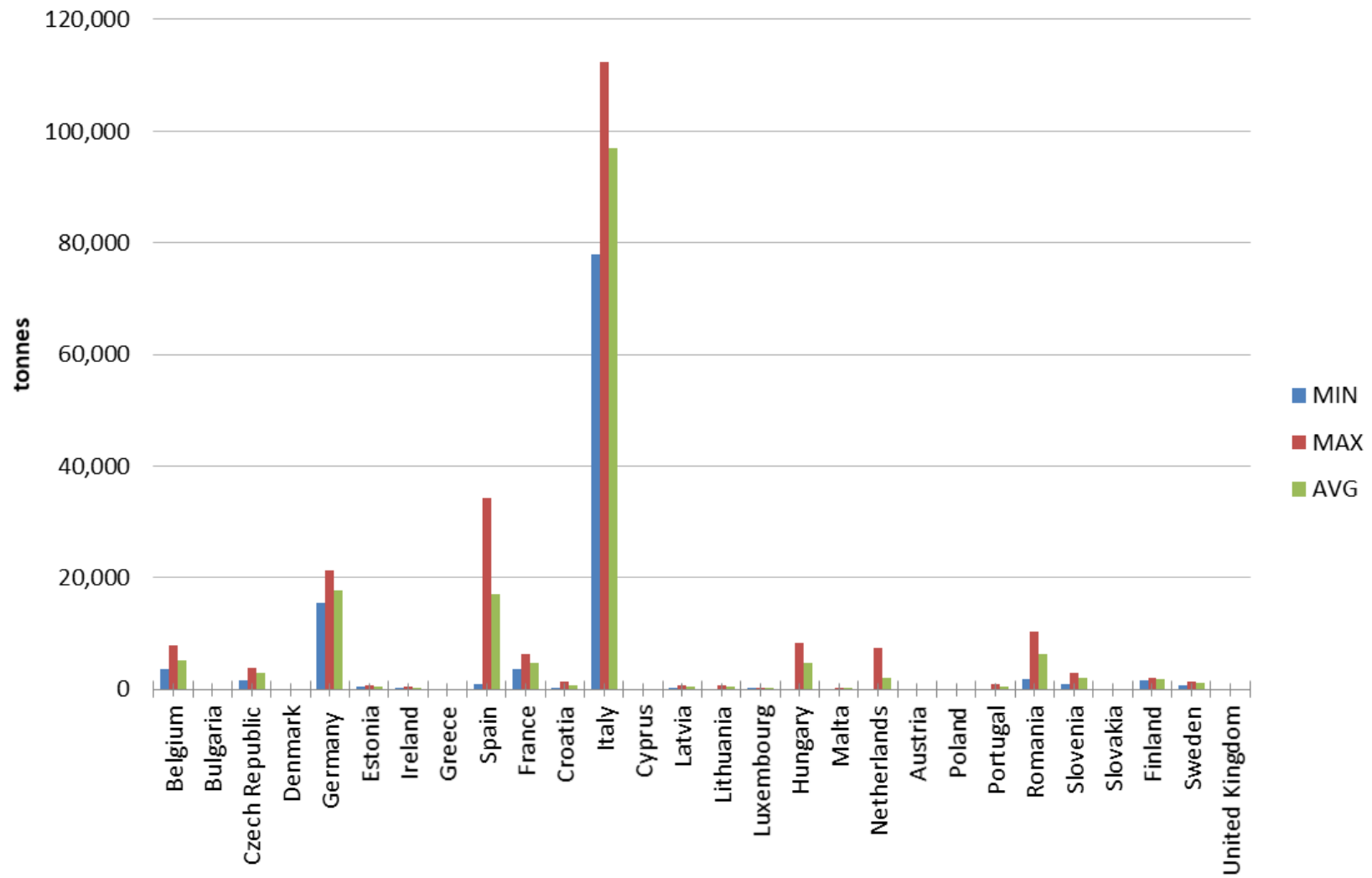


Figure 48 Tonnes of peach pomace per country, 2010-2015

Table 36 Consumption of fresh peaches (tonnes) per country, 2010-2015

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	17,994	18,261	18,417	18,528	18,560	18,654	17,994	18,654	18,403
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	20,924	20,973	21,011	21,032	21,025	21,077	20,924	21,077	21,007
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	204,506	200,555	200,820	201,309	201,919	202,994	200,555	204,506	202,017
Estonia	880	878	875	871	868	868	868	880	873
Ireland	2,411	2,423	2,429	2,433	2,441	2,453	2,411	2,453	2,432
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spain	74,379	74,667	74,909	74,765	74,420	74,319	74,319	74,909	74,576
France	192,683	193,637	194,525	195,489	196,507	198,135	192,683	198,135	195,163
Croatia	10,757	10,725	10,690	10,655	10,617	10,563	10,563	10,757	10,668
Italy	375,266	376,372	376,559	378,404	385,362	385,444	375,266	385,444	379,568
Cyprus	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Latvia	1,908	1,867	1,840	1,821	1,801	1,787	1,787	1,908	1,838
Lithuania	2,514	2,442	2,403	2,378	2,355	2,337	2,337	2,514	2,405
Luxembourg	1,255	1,280	1,312	1,343	1,374	1,407	1,255	1,407	1,329
Hungary	29,042	28,959	28,803	28,736	28,644	28,581	28,581	29,042	28,794
Malta	1,780	1,784	1,795	1,812	1,829	1,846	1,780	1,846	1,808
Netherlands	29,835	29,980	30,115	30,203	30,293	30,421	29,835	30,421	30,141
Austria	35,077	35,176	35,314	35,498	35,729	36,020	35,077	36,020	35,469
Poland	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Portugal	58,154	58,150	57,983	57,680	57,350	57,062	57,062	58,154	57,730
Romania	18,265	18,179	18,086	18,018	17,953	17,884	17,884	18,265	18,064
Slovenia	2,661	2,665	2,672	2,676	2,679	2,682	2,661	2,682	2,673
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	1,070	1,075	1,080	1,085	1,090	1,094	1,070	1,094	1,083
Sweden	19,615	19,773	19,914	20,067	20,254	20,469	19,615	20,469	20,016
United Kingdom	84,389	85,080	85,719	86,272	86,874	87,581	84,389	87,581	85,986

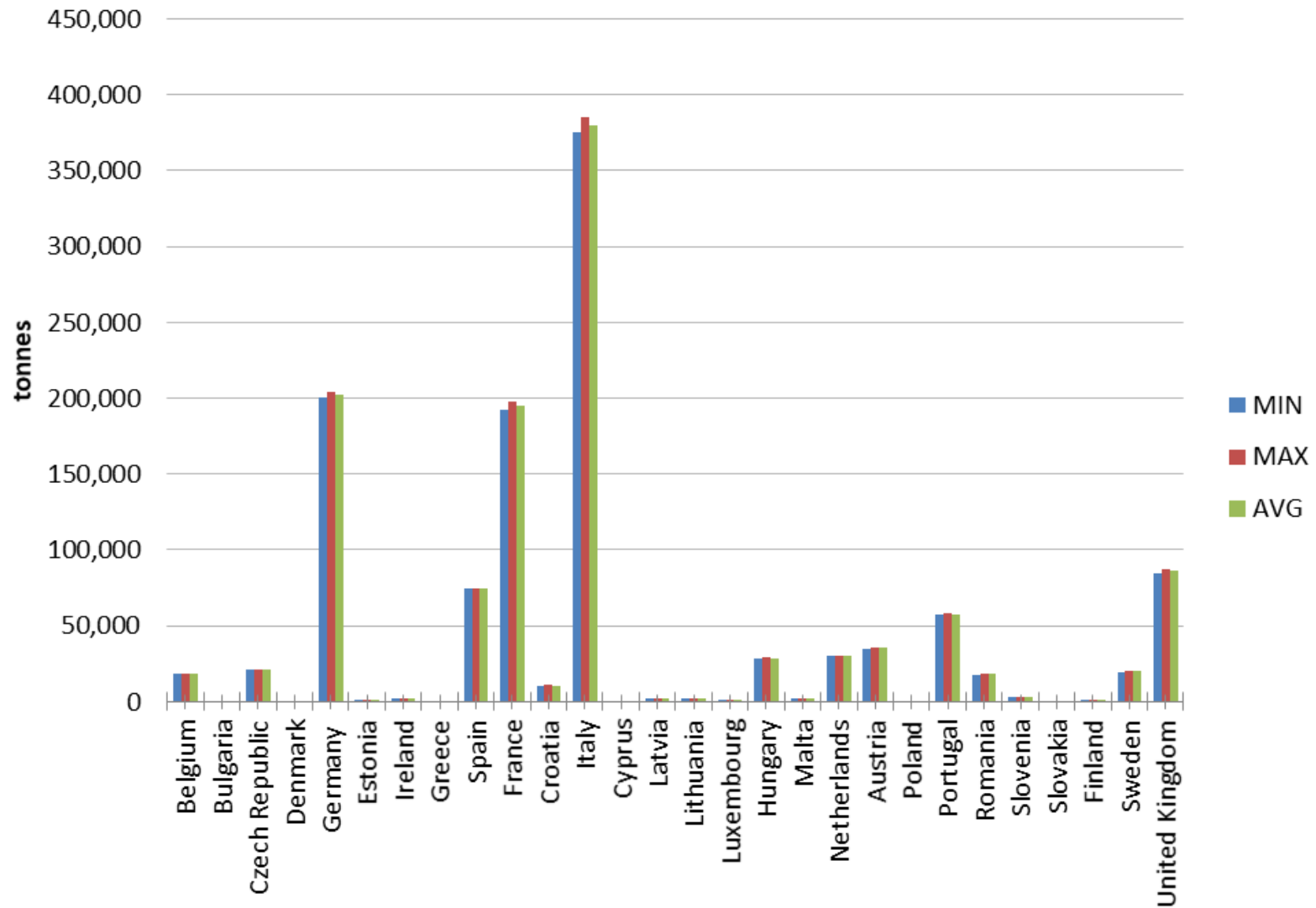


Figure 49 Consumption of fresh peaches (tonnes) per country, 2010-2015

Table 37 Tonnes of rotten peaches per country, 2010-2015

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	3,419	3,470	3,499	3,520	3,526	3,544	3,419	3,544	3,496
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	3,976	3,985	3,992	3,996	3,995	4,005	3,976	4,005	3,991
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	38,856	38,105	38,156	38,249	38,365	38,569	38,105	38,856	38,383
Estonia	167	167	166	166	165	165	165	167	166
Ireland	458	460	461	462	464	466	458	466	462
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spain	14,132	14,187	14,233	14,205	14,140	14,121	14,121	14,233	14,170
France	36,610	36,791	36,960	37,143	37,336	37,646	36,610	37,646	37,081
Croatia	2,044	2,038	2,031	2,025	2,017	2,007	2,007	2,044	2,027
Italy	71,300	71,511	71,546	71,897	73,219	73,234	71,300	73,234	72,118
Cyprus	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Latvia	363	355	350	346	342	340	340	363	349
Lithuania	478	464	457	452	447	444	444	478	457
Luxembourg	238	243	249	255	261	267	238	267	252
Hungary	5,518	5,502	5,472	5,460	5,442	5,430	5,430	5,518	5,471
Malta	338	339	341	344	348	351	338	351	344
Netherlands	5,669	5,696	5,722	5,739	5,756	5,780	5,669	5,780	5,727
Austria	6,665	6,683	6,710	6,745	6,788	6,844	6,665	6,844	6,739
Poland	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Portugal	11,049	11,048	11,017	10,959	10,897	10,842	10,842	11,049	10,969
Romania	3,470	3,454	3,436	3,423	3,411	3,398	3,398	3,470	3,432
Slovenia	506	506	508	509	509	510	506	510	508
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	203	204	205	206	207	208	203	208	206
Sweden	3,727	3,757	3,784	3,813	3,848	3,889	3,727	3,889	3,803
United Kingdom	16,034	16,165	16,287	16,392	16,506	16,640	16,034	16,640	16,337

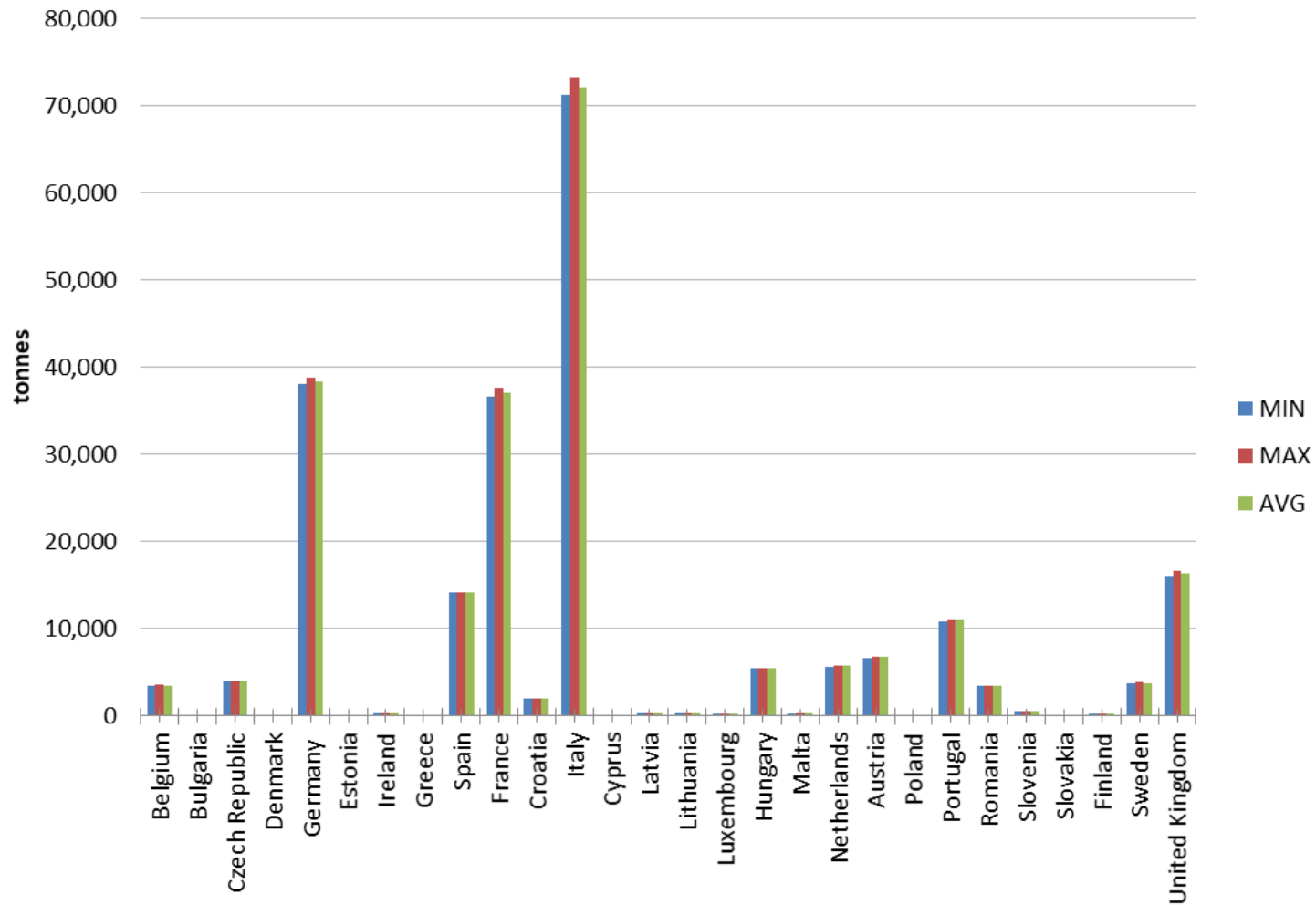


Figure 50 Tonnes of rotten peaches per country, 2010-2015

Table 38 Tonnes of peach kernel from consumption per country, 2010-2015

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	1,080	1,096	1,105	1,112	1,114	1,119	1,080	1,119	1,104
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	1,255	1,258	1,261	1,262	1,261	1,265	1,255	1,265	1,260
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	12,270	12,033	12,049	12,079	12,115	12,180	12,033	12,270	12,121
Estonia	53	53	52	52	52	52	52	53	52
Ireland	145	145	146	146	146	147	145	147	146
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spain	4,463	4,480	4,495	4,486	4,465	4,459	4,459	4,495	4,475
France	11,561	11,618	11,672	11,729	11,790	11,888	11,561	11,888	11,710
Croatia	645	643	641	639	637	634	634	645	640
Italy	22,516	22,582	22,594	22,704	23,122	23,127	22,516	23,127	22,774
Cyprus	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Latvia	115	112	110	109	108	107	107	115	110
Lithuania	151	147	144	143	141	140	140	151	144
Luxembourg	75	77	79	81	82	84	75	84	80
Hungary	1,742	1,738	1,728	1,724	1,719	1,715	1,715	1,742	1,728
Malta	107	107	108	109	110	111	107	111	108
Netherlands	1,790	1,799	1,807	1,812	1,818	1,825	1,790	1,825	1,808
Austria	2,105	2,111	2,119	2,130	2,144	2,161	2,105	2,161	2,128
Poland	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Portugal	3,489	3,489	3,479	3,461	3,441	3,424	3,424	3,489	3,464
Romania	1,096	1,091	1,085	1,081	1,077	1,073	1,073	1,096	1,084
Slovenia	160	160	160	161	161	161	160	161	160
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	64	65	65	65	65	66	64	66	65
Sweden	1,177	1,186	1,195	1,204	1,215	1,228	1,177	1,228	1,201
United Kingdom	5,063	5,105	5,143	5,176	5,212	5,255	5,063	5,255	5,159

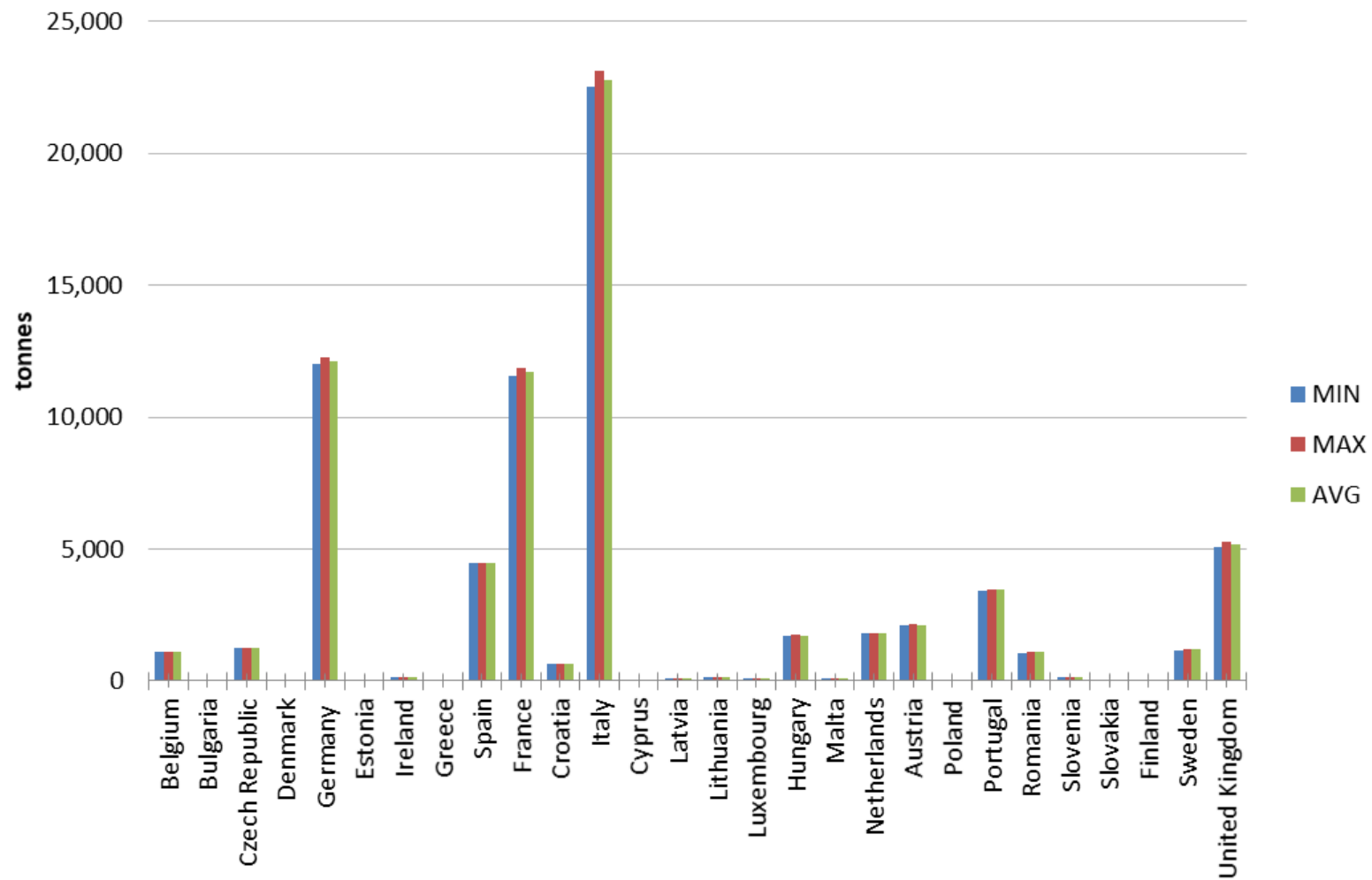


Figure 51 Tonnes of peach kernel from consumption per country, 2010-2015

2.5 Small citrus fruit

A small citrus fruit is closely related to orange (45). Name for fruit comes from Mediterranean country, Morocco, place of Tangier. Both grow in the same climate conditions worldwide. Small citrus fruits are smaller than oranges (46) as shown in Figure 52, but their nutritional values are very similar (47).

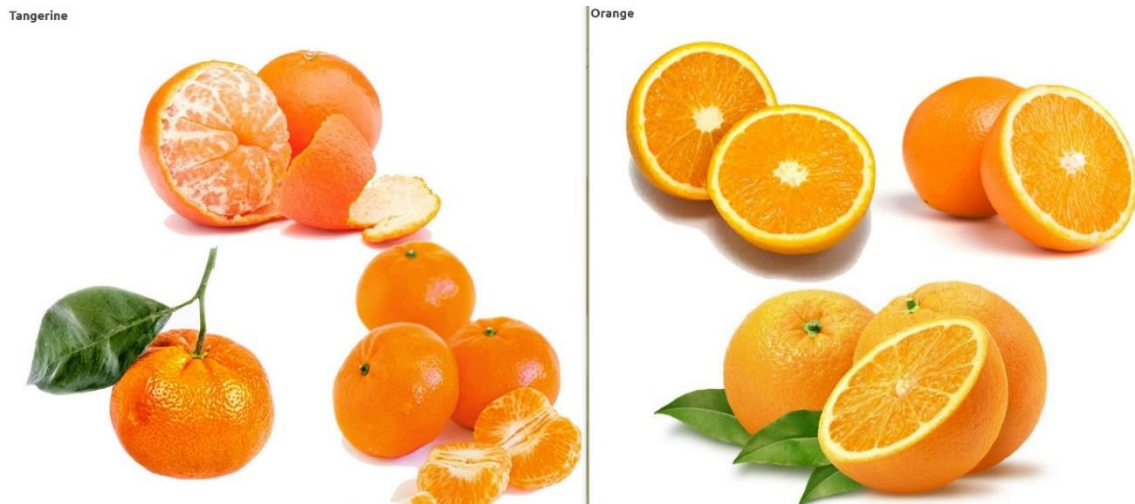


Figure 52 Oranges and small citrus fruits (46)

The AWCB that occurs in the small citrus fruit production chain is similar to that of oranges. Tangerine trees need minimal pruning, and the tangerine tree is shown in Figure 53 (48).



Figure 53 Tangerine tree (38)

Small citrus fruits are used in the food processing industry for the production of syrup, juice and jam. Solid AWCB that occurs during processing stage consists of peel and pips. Figure 54 shows a rotten small citrus fruit that is no longer safe for human consumption (49).



Figure 54 Rotten tangerine, i.e. small citrus fruit (49)

The flowchart (Figure 55) presents the value chain for small citrus fruits and specific AWCB weight factors from Table 2.

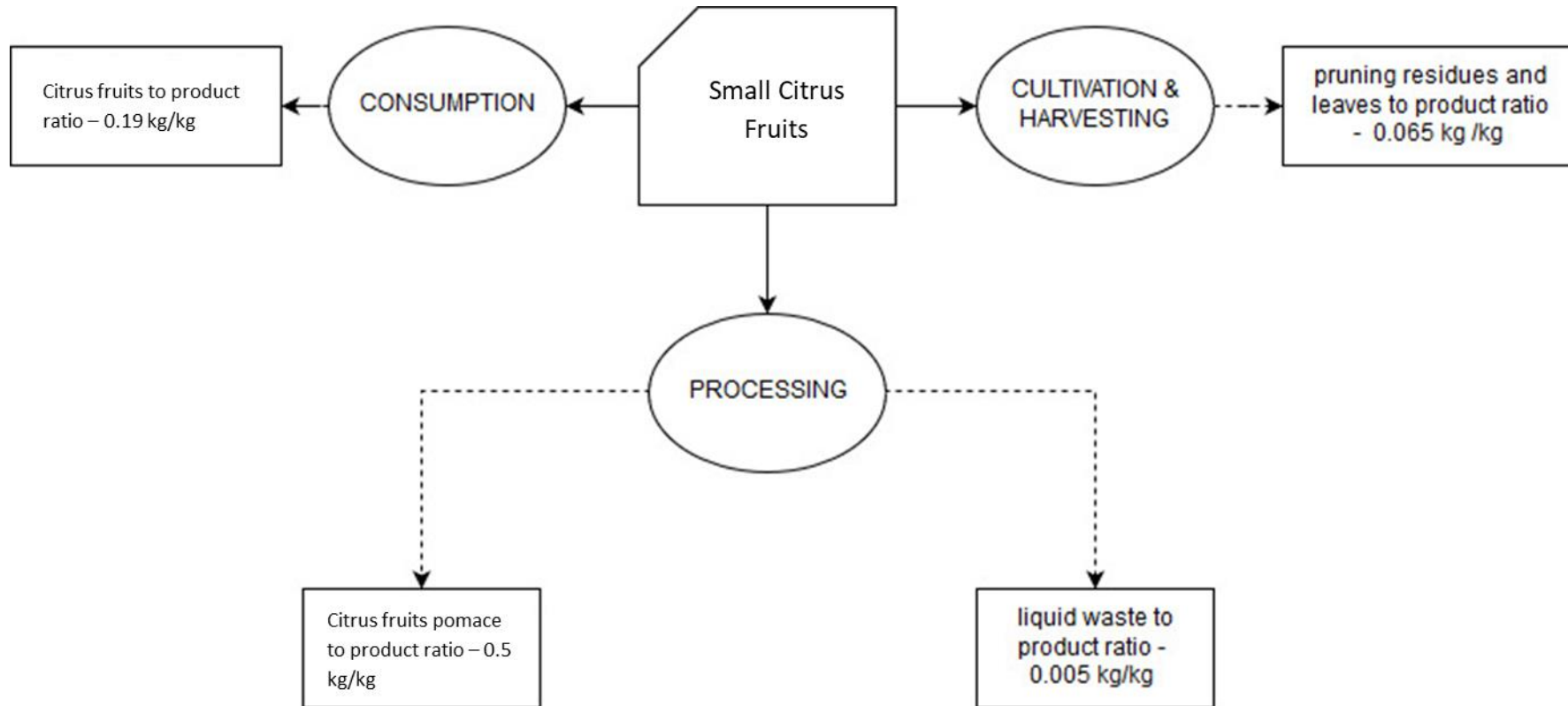


Figure 55 Small citrus fruit AWCB value chain

Data for cultivated small citrus fruit is taken from EUROSTAT (50), and data for imported and exported small citrus fruit is taken from FAOSTAT. From specific consumption of small citrus fruit and population in the country, the quantity of consumed tangerines is calculated. By using relation (I-VIII), the quantity of processed small citrus fruit is calculated for every country in each given year. Then the quantity of AWCB is calculated for every step and every year. Below is an example calculation for Spain in 2010:

PRD = 2,228,500 tonnes

IMP = 7,410 tonnes

EXP = 1,483,589 tonnes

CON = 232,433 tonnes

PRC = (2,228,500 + 7,410) - (1,483,589 + 232,433) tonnes = 519,888 tonnes

The quantity of pruning residue is 0.065 kg per kg of harvested small citrus fruit: for Spain (2010), it was 144,853 tonnes in 2010. The liquid AWCB is 0.005 kg per kg of processed small citrus fruit, and the small citrus fruit pomace AWCB is 0.27 kg per kg of processed small citrus fruit. For Spain, the quantity of liquid AWCB was 2,599 tonnes and of small citrus fruit pomace, AWCB was 259,944 tonnes in 2010. The quantity of consumed small citrus fruit for Spain was 232,433 tonnes in 2010. 44,162 tonnes of small citrus fruit aimed for consumption went mouldy (rotten). Results for other countries are shown in the tables and figures below.

Table 39 Tonnes of harvested small citrus fruits per country, 2010-2013 (28)

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	0	0	0	0	0	0	0
Bulgaria	0	0	0	0	0	0	0
Czech Republic	0	0	0	0	0	0	0
Denmark	0	0	0	0	0	0	0
Germany	0	0	0	0	0	0	0
Estonia	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0
Greece	109,500	129,200	105,650	120,950	105,650	129,200	116,325
Spain	2,228,500	2,117,119	1,872,400	2,198,900	1,872,400	2,228,500	2,104,230
France	27,730	36,330	40,830	31,740	27,730	40,830	34,158
Croatia	55,486	41,870	50,790	40,020	40,020	55,486	47,042
Italy	841,960	1,393,910	776,650	642,800	642,800	1,393,910	913,830
Cyprus	41,785	52,294	45,540	42,490	41,785	52,294	45,527
Latvia	0	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0
Luxembourg	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	0	0
Malta	104	106	81	79	79	106	93
Netherlands	0	0	0	0	0	0	0
Austria	0	0	0	0	0	0	0
Poland	0	0	0	0	0	0	0
Portugal	34,290	34,190	35,700	36,320	34,190	36,320	35,125
Romania	0	0	0	0	0	0	0
Slovenia	0	0	0	0	0	0	0
Slovakia	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0
Sweden	0	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0	0

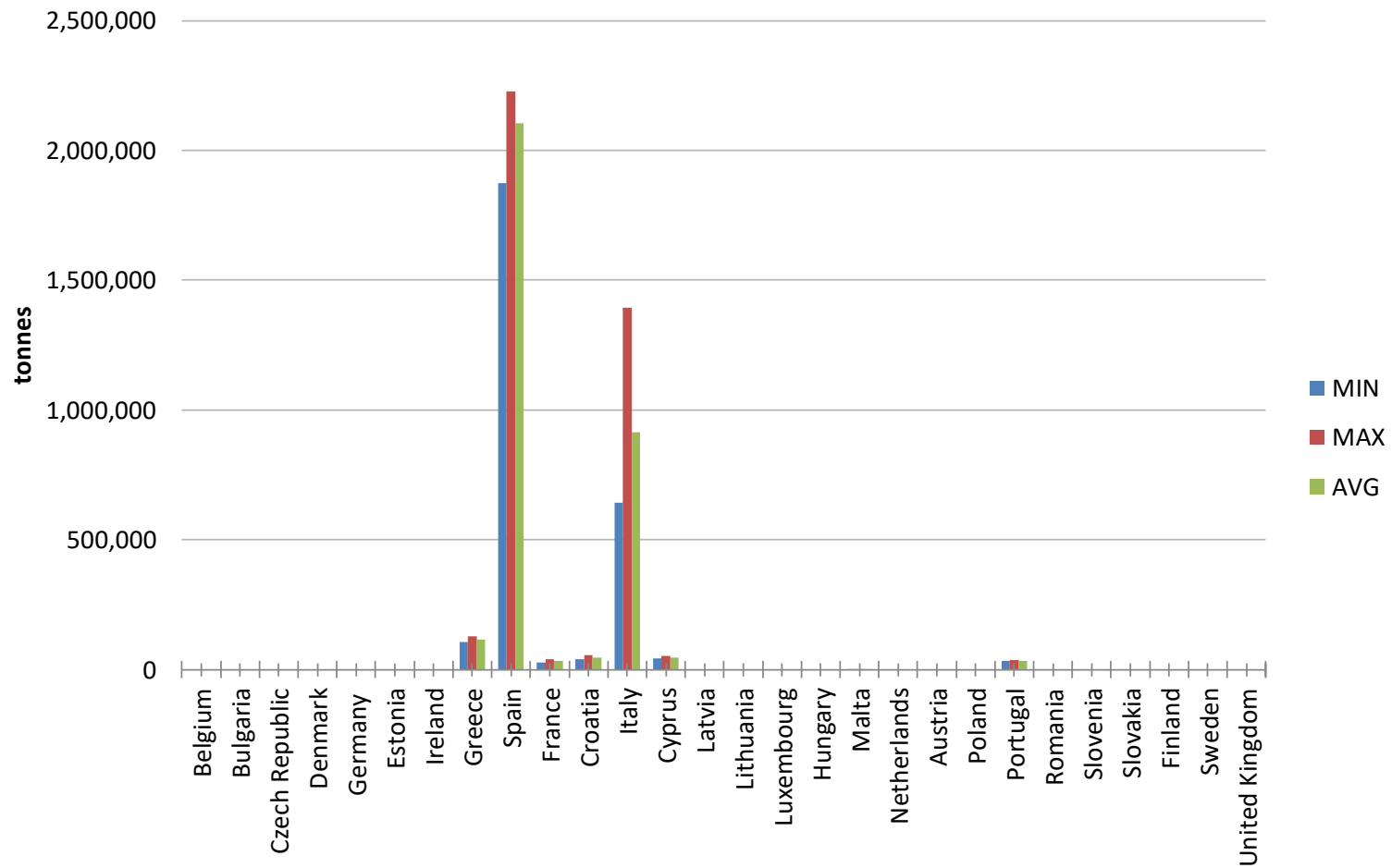


Figure 56 Tonnes of harvested small citrus fruits per country, 2010-2013

Table 40 Tonnes of small citrus fruit pruning residues and leaves per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	0	0	0	0	0	0	0
Bulgaria	0	0	0	0	0	0	0
Czech Republic	0	0	0	0	0	0	0
Denmark	0	0	0	0	0	0	0
Germany	0	0	0	0	0	0	0
Estonia	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0
Greece	7,118	8,398	6,867	7,862	6,867	8,398	7,561
Spain	144,853	137,613	121,706	142,929	121,706	144,853	136,775
France	1,802	2,361	2,654	2,063	1,802	2,654	2,220
Croatia	3,607	2,722	3,301	2,601	2,601	3,607	3,058
Italy	54,727	90,604	50,482	41,782	41,782	90,604	59,399
Cyprus	2,716	3,399	2,960	2,762	2,716	3,399	2,959
Latvia	0	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0
Luxembourg	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	0	0
Malta	7	7	5	5	5	7	6
Netherlands	0	0	0	0	0	0	0
Austria	0	0	0	0	0	0	0
Poland	0	0	0	0	0	0	0
Portugal	2,229	2,222	2,321	2,361	2,222	2,361	2,283
Romania	0	0	0	0	0	0	0
Slovenia	0	0	0	0	0	0	0
Slovakia	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0
Sweden	0	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0	0

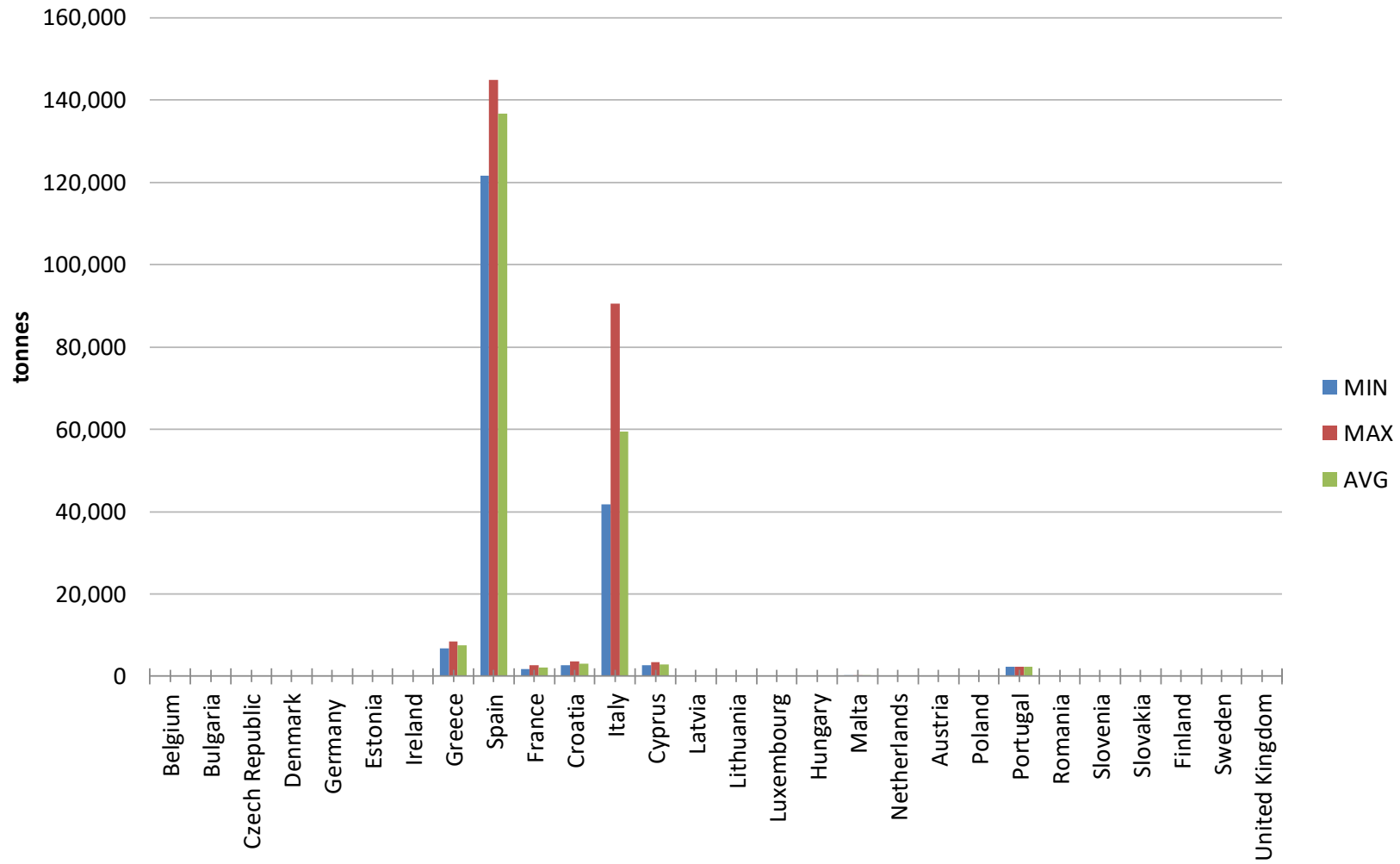


Figure 57 Tonnes of small citrus fruit pruning residues and leaves per country, 2010-2013

Table 41 Tonnes of imported and exported small citrus fruits per country, 2010-2013 (28)

GEO/POPULATION	Trade	2010	2011	2012	2013
Belgium	Import	62,187	65,453	67,015	72,751
	Export	9,606	10,921	14,019	16,549
Bulgaria	Import	16,446	16,468	15,647	15,520
	Export	1,291	1,371	1,913	1,415
Czech Republic	Import	53,002	57,577	61,455	51,267
	Export	8,343	9,366	11,454	8,172
Denmark	Import	34,991	39,690	32,582	27,738
	Export	1,466	2,499	1,909	2,172
Germany	Import	354,294	383,032	397,262	361,610
	Export	25,703	21,980	17,317	19,427
Estonia	Import	7,320	8,362	8,251	6,108
	Export	14	22	14	29
Ireland	Import	15,382	13,808	20,604	19,034
	Export	720	628	569	815
Greece	Import	4,712	3,017	3,875	3,075
	Export	76,052	68,854	84,545	86,796
Spain	Import	7,410	5,587	5,140	6,421
	Export	1,483,589	1,590,319	1,715,802	1,567,869
France	Import	351,578	336,315	361,203	333,973
	Export	38,971	34,457	36,949	31,404
Croatia	Import	3,756	4,688	5,801	4,258
	Export	41,441	26,023	36,304	20,438
Italy	Import	75,897	82,892	95,060	89,194
	Export	101,399	112,861	103,352	67,374
Cyprus	Import	321	253	165	118
	Export	27,849	27,105	27,609	29,508
Latvia	Import	13,486	15,811	15,580	13,061
	Export	1,897	3,481	3,335	3,518
Lithuania	Import	42,116	46,384	47,718	46,492
	Export	31,463	37,398	36,824	35,367
Luxembourg	Import	2,771	2,535	2,561	2,546
	Export	108	112	107	74

Hungary	Import	12,302	15,213	13,852	13,415
	Export	1,489	3,883	2,568	2,895
Malta	Import	801	1,043	872	674
	Export	0	0	0	0
Netherlands	Import	224,001	191,410	184,179	186,426
	Export	101,149	86,351	72,120	62,635
Austria	Import	48,692	42,303	46,893	43,796
	Export	14,969	13,464	14,217	10,705
Poland	Import	149,564	166,519	180,124	146,876
	Export	29,171	48,574	54,300	46,415
Portugal	Import	14,331	14,957	18,410	19,263
	Export	2,660	3,745	9,616	8,581
Romania	Import	42,978	36,624	43,036	48,143
	Export	1,356	871	2,059	1,188
Slovenia	Import	20,746	18,081	18,530	16,270
	Export	13,822	17,371	15,833	10,788
Slovakia	Import	24,441	27,016	27,462	25,330
	Export	3,454	5,193	4,338	4,856
Finland	Import	39,813	36,563	36,294	36,376
	Export	101	155	34	59
Sweden	Import	52,864	53,056	55,194	50,678
	Export	503	1,192	359	268
United Kingdom	Import	253,049	265,012	267,163	274,533
	Export	5,535	5,737	3,596	3,662

Table 42 Tonnes of processed small citrus fruits per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Estonia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Greece	0	7,746	0	0	0	7,746	1,937
Spain	519,888	299,051	0	403,813	0	519,888	305,688
France	17,043	13,294	38,699	6,307	6,307	38,699	18,836
Croatia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy	520,507	1,067,118	471,387	366,194	366,194	1,067,118	606,301
Cyprus	10,161	21,243	13,786	8,771	8,771	21,243	13,490
Latvia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lithuania	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Luxembourg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hungary	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	905	1,149	953	753	753	1,149	940
Netherlands	39,977	21,780	28,407	39,893	21,780	39,977	32,514
Austria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poland	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Romania	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovenia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	12,955	9,532	9,254	9,184	9,184	12,955	10,231
Sweden	5,658	4,786	7,421	2,631	2,631	7,421	5,124
United Kingdom	N/A	N/A	N/A	N/A	N/A	N/A	N/A

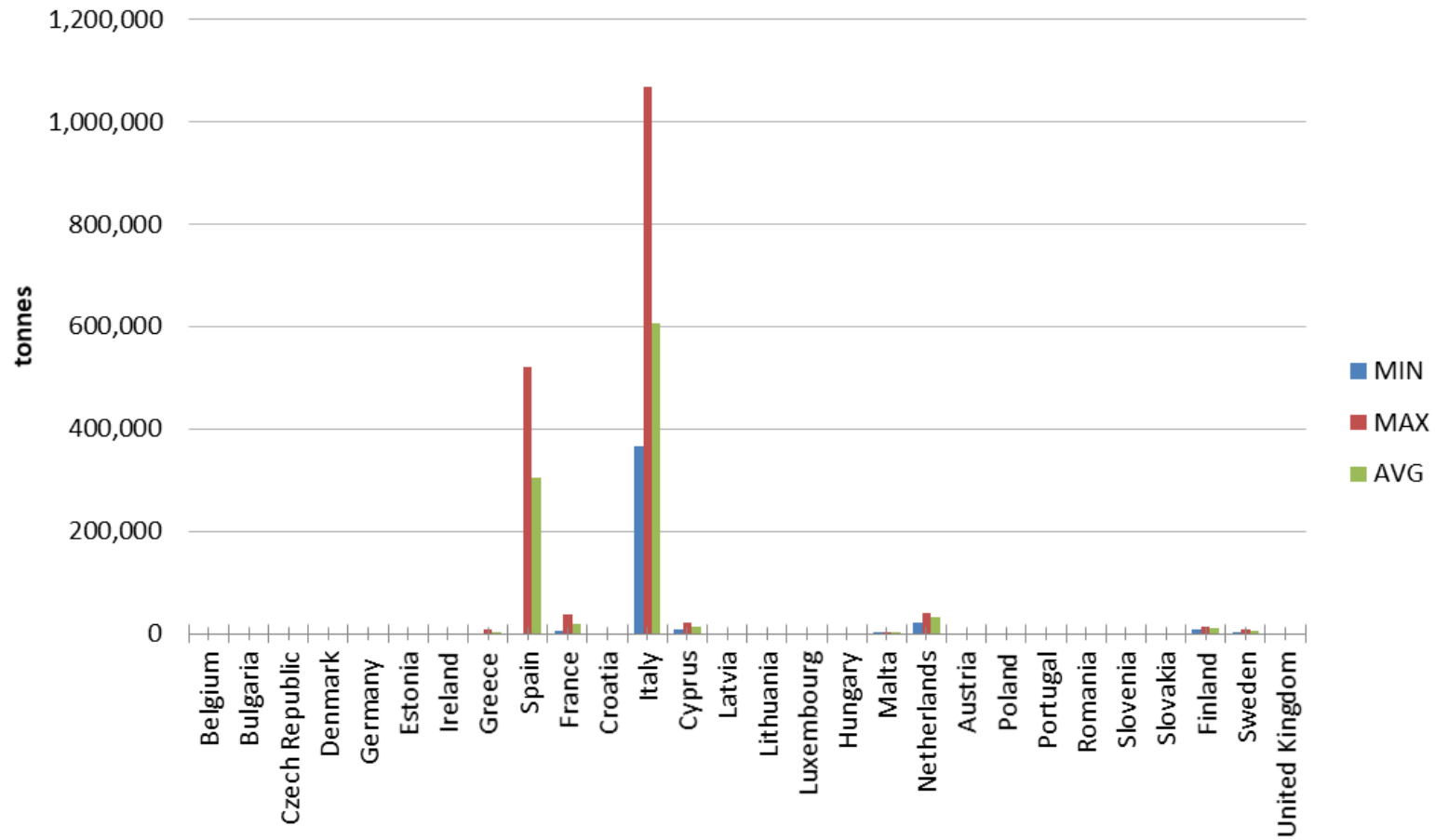


Figure 58 Tonnes of processed small citrus fruits per country, 2010-2013

Table 43 Tonnes of small citrus fruit liquid AWCB per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Estonia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Greece	0	39	0	0	0	39	10
Spain	2,599	1,495	0	2,019	0	2,599	1,528
France	85	66	193	32	32	193	94
Croatia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy	2,603	5,336	2,357	1,831	1,831	5,336	3,032
Cyprus	51	106	69	44	44	106	67
Latvia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lithuania	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Luxembourg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hungary	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	5	6	5	4	4	6	5
Netherlands	200	109	142	199	109	200	163
Austria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poland	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Romania	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovenia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	65	48	46	46	46	65	51
Sweden	28	24	37	13	13	37	26
United Kingdom	N/A	N/A	N/A	N/A	N/A	N/A	N/A

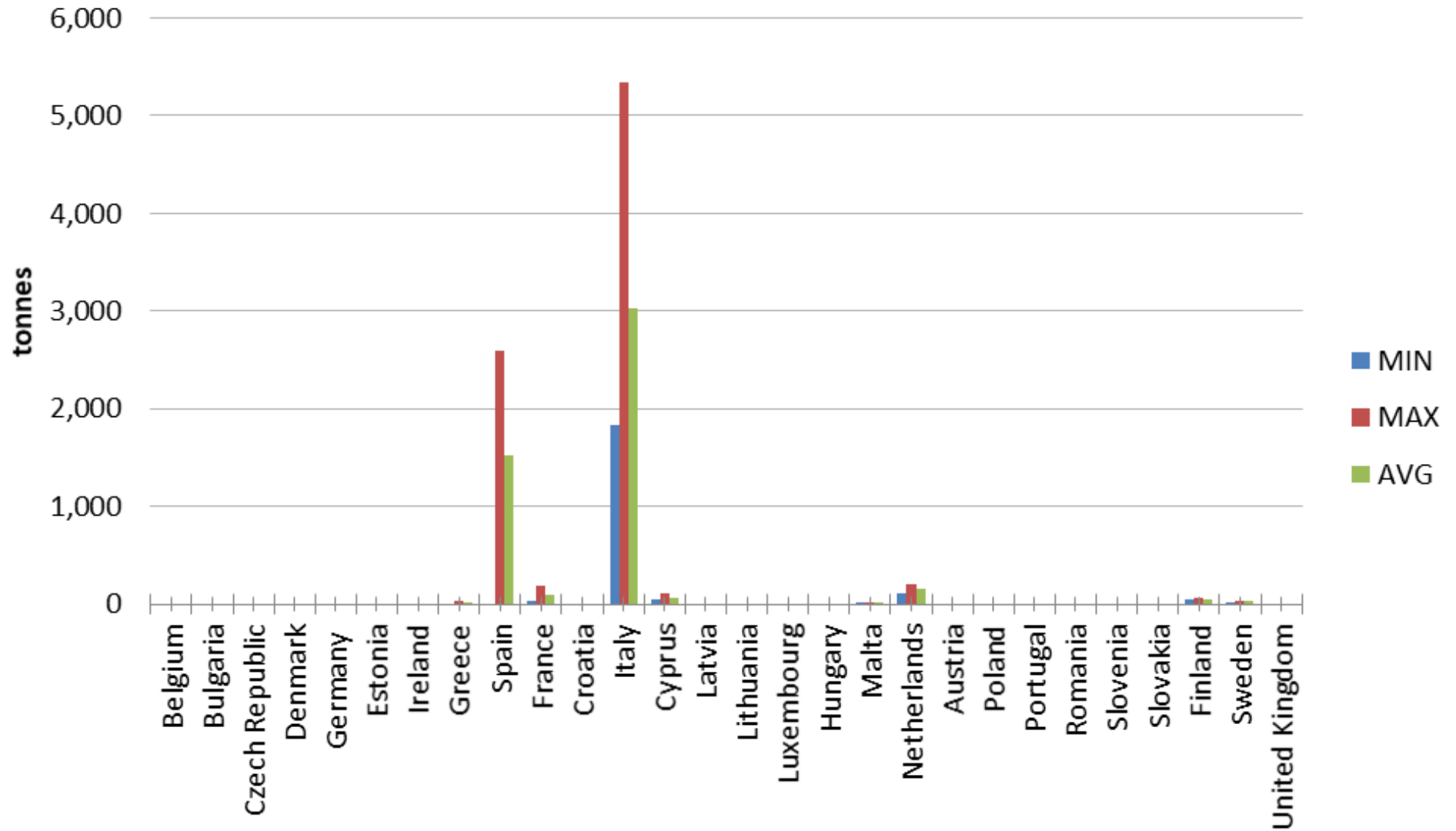


Figure 59 Tonnes of small citrus fruit liquid AWCB per country, 2010-2013

Table 44 Tonnes of small citrus fruit pomace AWCB per country, 2010-2013

GEO/TIME	2010	2011	2012	2013	MIN	MAX	AVG
Belgium	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Estonia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Greece	0	3,873	0	0	0	3,873	968
Spain	259,944	149,526	0	201,906	0	259,944	152,844
France	8,521	6,647	19,350	3,154	3,154	19,350	9,418
Croatia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy	260,254	533,559	235,693	183,097	183,097	533,559	303,151
Cyprus	5,081	10,622	6,893	4,385	4,385	10,622	6,745
Latvia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lithuania	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Luxembourg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hungary	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	453	575	477	377	377	575	470
Netherlands	19,989	10,890	14,204	19,947	10,890	19,989	16,257
Austria	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poland	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Romania	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovenia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	6,477	4,766	4,627	4,592	4,592	6,477	5,115
Sweden	2,829	2,393	3,710	1,315	1,315	3,710	2,562
United Kingdom	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Figure 60 Tonnes of small citrus fruit pomace AWCB per country, 2010-2013

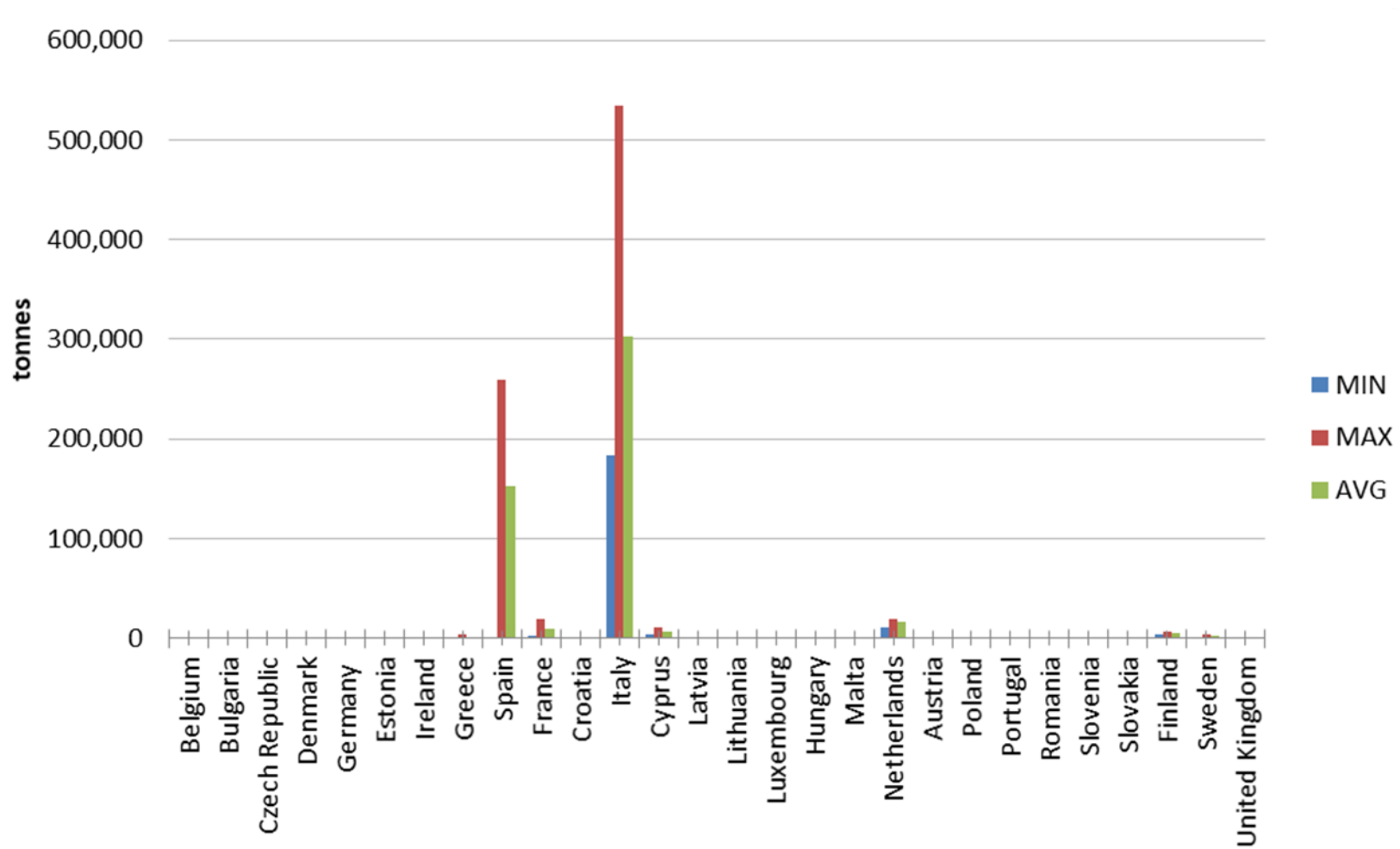


Table 45 Consumption of small citrus fruits (tonnes) per country, 2010-2015

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Estonia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Greece	55,596	55,617	55,432	55,018	54,634	54,290	54,290	55,617	55,098
Spain	232,433	233,336	234,091	233,639	232,561	232,248	232,248	234,091	233,051
France	323,294	324,894	326,385	328,002	329,710	332,441	323,294	332,441	327,454
Croatia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy	295,951	296,823	296,971	298,426	303,913	303,978	295,951	303,978	299,344
Cyprus	4,096	4,199	4,310	4,329	4,290	4,235	4,096	4,329	4,243
Latvia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lithuania	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Luxembourg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hungary	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	0	0	0	0	0	0	0	0	0
Netherlands	82,875	83,279	83,652	83,898	84,146	84,504	82,875	84,504	83,726
Austria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poland	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Romania	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovenia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	26,757	26,876	27,006	27,133	27,256	27,359	26,757	27,359	27,065
Sweden	46,703	47,078	47,414	47,779	48,224	48,737	46,703	48,737	47,656
United Kingdom	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

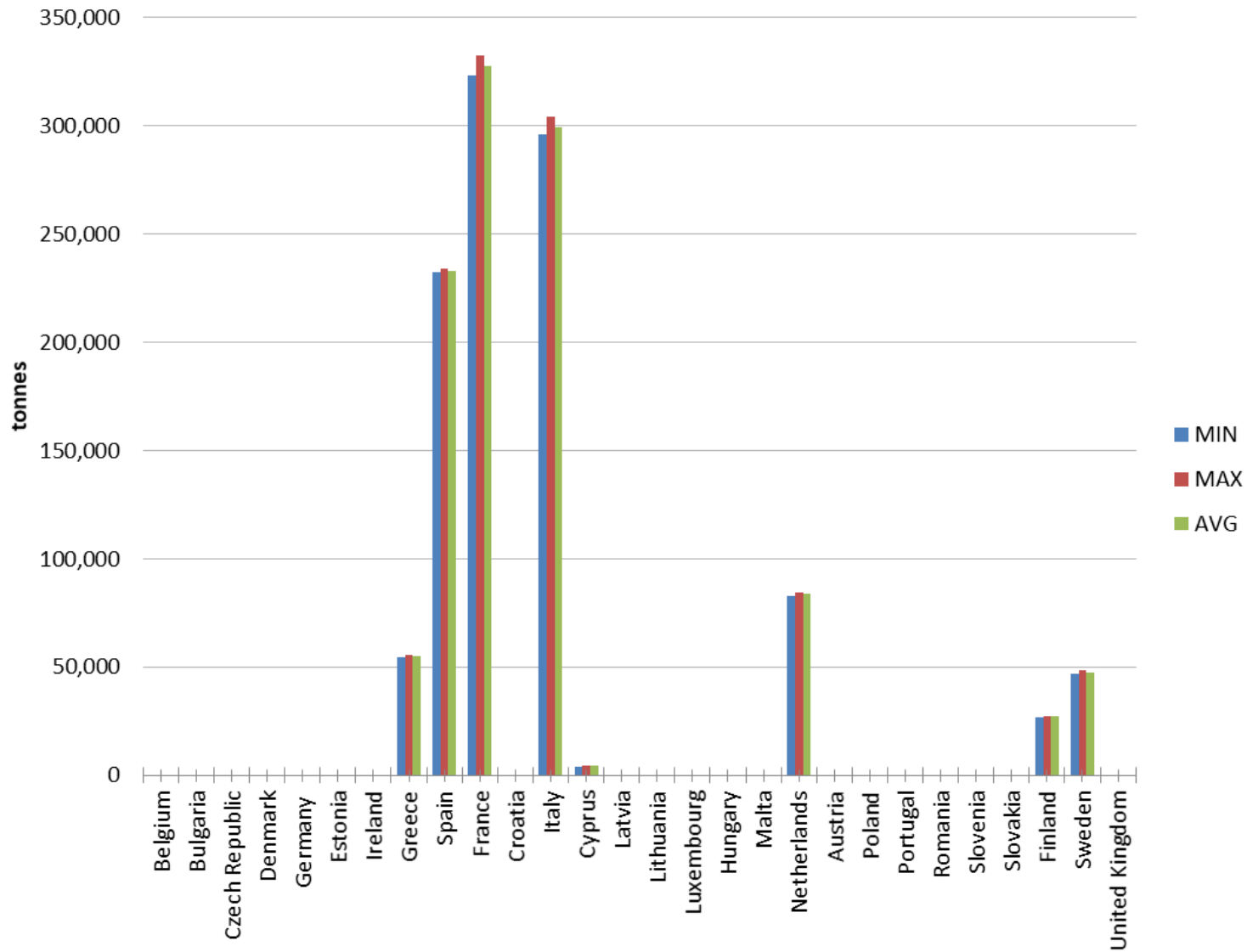


Figure 61 Consumption of fresh small citrus fruits (tonnes) per country, 2010-2015

Table 46 Tonnes of rotten small citrus fruits per country, 2010-2015

GEO/TIME	2010	2011	2012	2013	2014	2015	MIN	MAX	AVG
Belgium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bulgaria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Czech Republic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Germany	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Estonia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Greece	10,563	10,567	10,532	10,453	10,380	10,315	10,315	10,567	10,469
Spain	44,162	44,334	44,477	44,391	44,187	44,127	44,127	44,477	44,280
France	61,426	61,730	62,013	62,320	62,645	63,164	61,426	63,164	62,216
Croatia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy	56,231	56,396	56,424	56,701	57,744	57,756	56,231	57,756	56,875
Cyprus	778	798	819	823	815	805	778	823	806
Latvia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lithuania	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Luxembourg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hungary	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	0	0	0	0	0	0	0	0	0
Netherlands	15,746	15,823	15,894	15,941	15,988	16,056	15,746	16,056	15,908
Austria	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poland	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Romania	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovenia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovakia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Finland	5,084	5,107	5,131	5,155	5,179	5,198	5,084	5,198	5,142
Sweden	8,874	8,945	9,009	9,078	9,163	9,260	8,874	9,260	9,055
United Kingdom	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

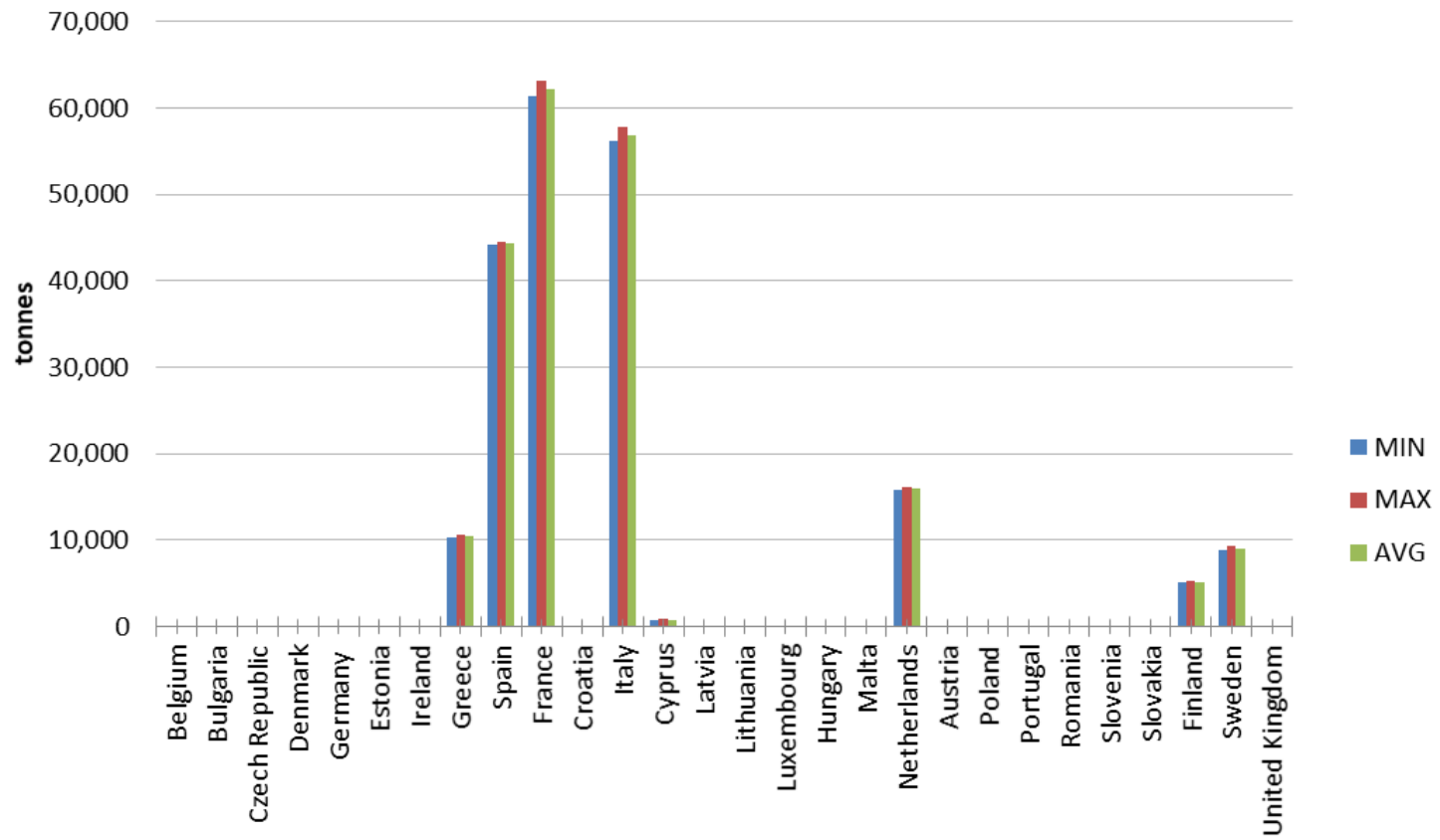


Figure 62 Tonnes of rotten small citrus fruits per country, 2010-2015

3 Current practices of commodity AWCB valorisation

AWCB that occur along the supply chain from field to fork can be valorised in different ways. If any disease does not affect the AWCB it can be used as a feed for animals. For example, apple pomace can also be used as a pig feed (51). Another valorisation pathway for apple pomace is the production of an added-value product, such as Biochemicals, especially bioethanol (52). Furthermore, chemical analysis of apple pomace showed that it could be used as a substrate for aroma production (53). Generally, AWCB from apple processing can be used for biosynthesis of some chemicals, for example, fumaric acid (54), Figure 65. The fumaric acid is used as a component for the production of paints and plastics, and also in the food industry as a preservative (55).

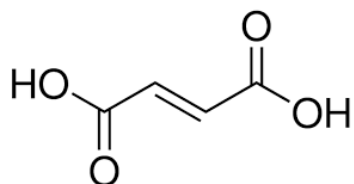


Figure 63 Fumaric acid structure (55)

Grape pomace is traditionally used in some European countries to produce brandy. Grape pomace can also be used for heavy metal remediation (56). Wastewater from different processing industry may contain a certain amount of heavy metals that are potentially dangerous for the environment. Metal ions are adsorbed on the surface of pomace and in that way removed from wastewater, Figure 66. Presence of heavy metals in human body causes incurable diseases of nervous system.

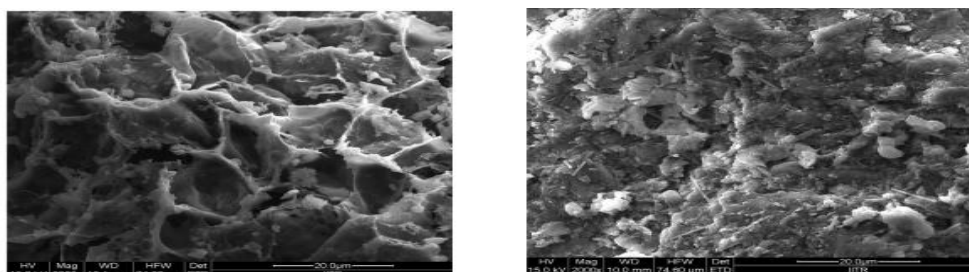


Figure 64 Surface of grape pomace, before (left) and after (right) heavy metals adsorption (56)

Grape pomace extract contains a certain amount of polyphenols that can be taken out by different chemicals (57). Polyphenols have a big role in chemical, biochemical and pharmaceutical applications.



Figure 65 Processing of phenols for pharmaceutical application (57)

In medicine, phenols are used in preventing diseases, such as cancer. The chemical composition of grape pomace shows that it contains VFA (Volatile Fatty Acids) (58). VFA-s is usually these three acids: acetic, propanoic and butyric acids. They are used in the aviation industry for deicing of aeroplanes (59). Another use of grape pomace is for medical purposes. Grape pomace contains some known anti-inflammatory compounds that could be extracted in several ways and used (60). Sugars from grape stalks can become a source for bioethanol production in the fermentation process, Figure 68 (61).



Figure 66 Grape stalks and stems after harvest (62)

Furthermore, grape stalks can be used as adsorbents for aquatic solutions of single metal ions and their mixtures (63). That research could have a huge impact on the treatment of wastewater that contains metal ions. Some study shows how wine lees can be used in the production of ethanol, calcium tartrate and yeast cells (64). Also, by using supercritical extraction, squalene can be taken out from wine lees (65). Squalene is a natural organic compound used in cosmetics, and more recently as an immunologic adjuvant in vaccines (66). The Chemical structure of squalene is shown in Figure 69.

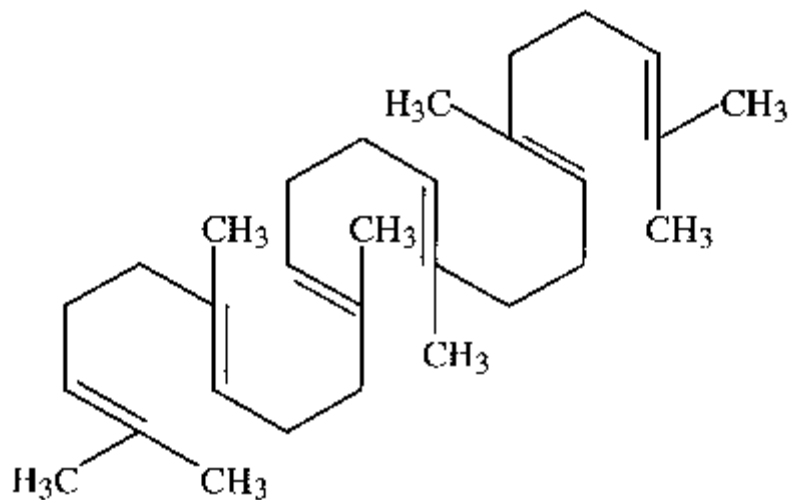


Figure 67 Chemical structure of squalene (67)

Another application of wine lees is for improvement of ice cream properties on the rheological level and adds an antioxidant level (68). Pectin is extracted from citrus peel and apple pomace. It is used as a gelling agent in jams and some sweets, Figure 70 (69).

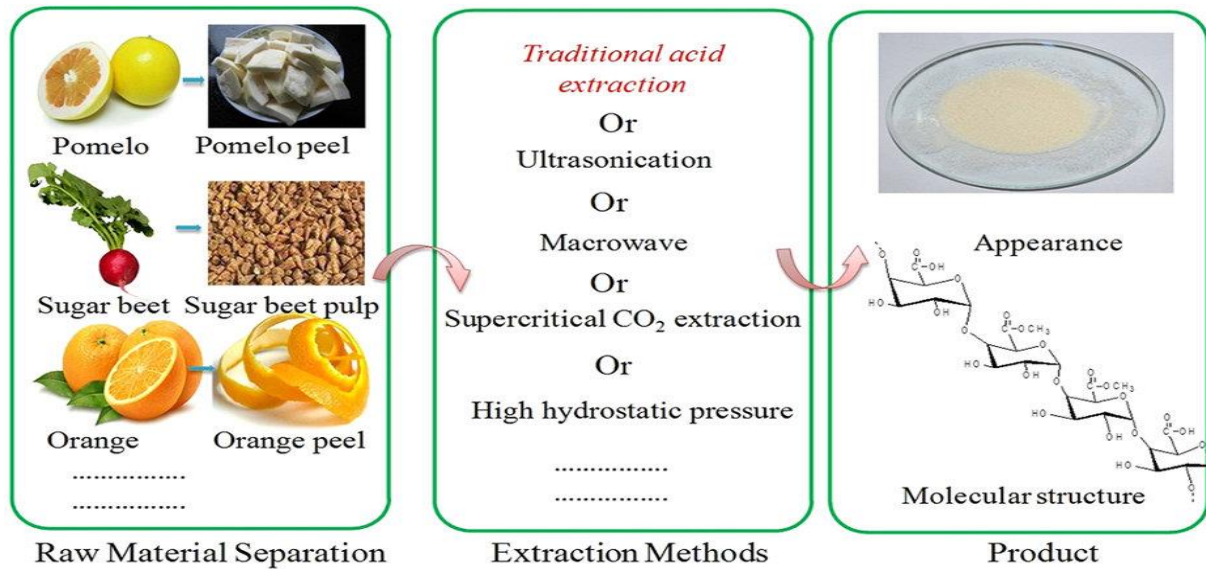


Figure 68 Process of pectin extraction from different residues of fruit and vegetable (69)

Furthermore, orange peel can be used for adsorption of some metals, for example, cadmium (70). Cadmium is one of the most toxic elements to humans. Primarily it is toxic to the kidney, especially to the proximal tubular cells, the main site of accumulation. Cadmium can also cause bone demineralization, either through direct bone damage or indirectly as a result of renal dysfunction. In the industry, excessive exposures to airborne cadmium may impair lung function and increase the risk of lung cancer. All these effects have been described in populations with relatively high exposures to cadmium in the industrial or in heavily polluted environments (71). Also, orange peel can be used as biocatalyst in a process of hydrolysis of esters (72). Orange peel and leaves can be used as a sorption material at various processes due to their rich chemical composition (fibres, soluble sugars, proteins, minerals and phenols) (73), (74). By-products of citrus processing can have a useful role in biochemical applications (producing bacteria that improve treatment of diseases on people) (75). Furthermore, citrus peel waste can be used as a substrate for anaerobic digestion, but chemical reaction is very slow. In order to improve the process of digestion, different biochar can be added (76). In a process of dark fermentation, peach pulp is converted to bio-hydrogen by using different inoculums (77) and schematic of bio-hydrogen production is shown in Figure 71.

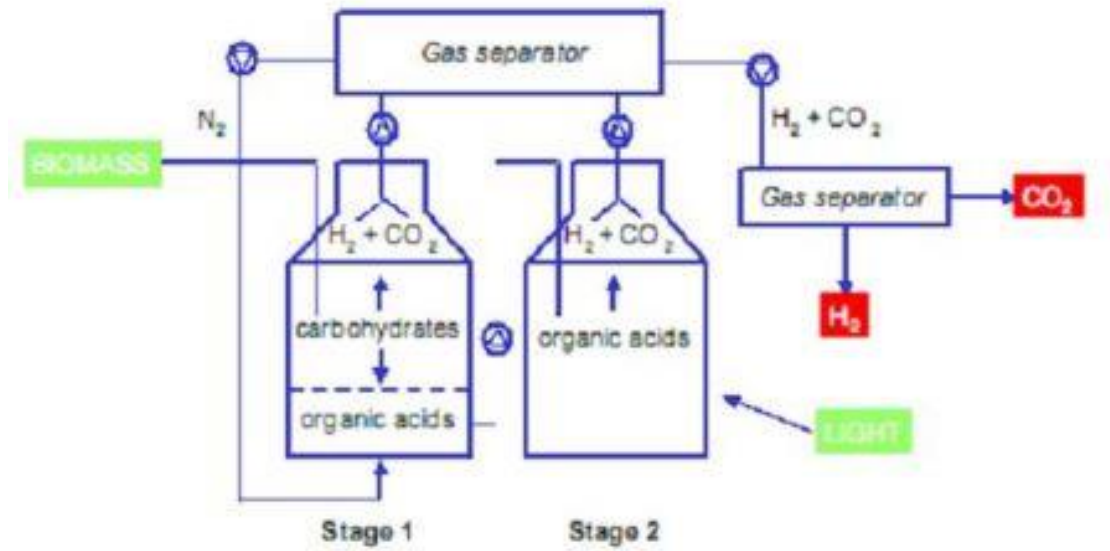


Figure 69 A schematic of bio-hydrogen production (78)

The peach kernel contains activated carbon that is successfully used in adsorption of contaminants in aqueous solutions (79). Small citrus fruit residues are shown to be good lining in the growth of some mushrooms (20).

Table 47 Characteristics, potential use and developed patents of fruit AWCB

AWCB source	Characteristics	Potential use	Patents
Cultivation	According to Table 2 and variety of analysed fruit, the chemical composition and physical properties of the AWCB generated in cultivation step is very complex	If the AWCB is affected by any disease its use as animal fodder should be avoided, residues of citrus fruit in combination with AWCBs from other steps could be used in biochemical applications (73), (74)	Pruning residues used as biomass for energetic purposes (80); pruning residues used in production of Biochemicals (81)
Harvesting	According to Table 2 and variety of analysed vegetables, the chemical composition and physical properties of the AWCB generated in harvesting step is very complex	If the fruit is damaged during harvesting it probably will not be suitable for consummation due to pathogenicity that could cause toxins (82)	Harvesting device that provides safety for harvesters and prevents fruit from damaging (83); improvement methods for post-harvest treatment of citrus fruit (84)
Processing	According to Table 2 and variety of analysed vegetables, the chemical composition and physical properties of the AWCB generated in harvesting step is very complex, for example, chemical composition of apple pomace is presented in (85), pomace mainly consists of fibres and carbohydrates	Pomace has many applications, in animal diet, for production of chemicals and materials for various application (51), (52), (53), (54), (56), (57); grape processing by-products have several aims of use (60), (63), (64), (65); citrus fruit processing by-products (75); peach pulp has a potential use in production of Biochemicals (77)	Extraction and production of chemicals from by-products of grape value chain (86), (87), (88); extraction of chemicals from citrus fruit and apple value chain (89), (90)
Consumption	Leftovers from consumption stage approximately are consisted of moisture, fat, proteins and carbohydrates (91), the percentage of each component depends on the composition of meal	Kernel from peach processing and consumption could be used as adsorption material (79); organic AWCB from consumption step could be digested and biogas produced (92); also leftovers from consummation can be used for biofuel production (93)	Extraction of chemicals from consummation leftovers (94); various used of degrading materials that include consummation by-products from fruit value chain (95)

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5 ANNEX - Consumption per capita

Consumption per capita of fresh fruit is given in the tables below. The key assumption is that the quantity of consumed fresh food does not change in the given period of time. A reputable source was chosen for the data. In some case this led to a negative figure in the processing calculation. In this situation the data was not used and can be seen by the use of **N/A**. In this situation more accurate consumption data is required to calculate AWCB at the processing stage.

Table 48 Apple consumption per capita in kg/year

Country	Kg/capita/year	Reference	Comment
Belgium	N/A		No reliable data available
Bulgaria	N/A		No reliable data available
Czech Republic	N/A		No reliable data available
Denmark	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
Germany	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
Estonia	N/A		No reliable data available
Ireland	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
Greece	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
Spain	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
France	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
Croatia	N/A		No reliable data available
Italy	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
Cyprus	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
Latvia	N/A		No reliable data available
Lithuania	N/A		No reliable data available
Luxembourg	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
Hungary	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
Malta	N/A		No reliable data available
Netherlands	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
Austria	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
Poland	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
Portugal	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
Romania	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
Slovenia	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
Slovakia	N/A		No reliable data available
Finland	N/A		No reliable data available

Sweden	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	
United Kingdom	11.6	https://ec.europa.eu/agriculture/sites/agriculture/files/dashboards/apple-dashboard_en.pdf	

Table 49 Grape consumption per capita in kg/year

Country	Kg/capita/year	Reference	Comment
Belgium	3.70	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Bulgaria	4.00	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Czech Republic	4.30	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Denmark	5.10	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Germany	3.00	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Estonia	3.30	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Ireland	2.50	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Greece	14.20	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Spain	3.40	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
France	2.06	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Croatia	5.50	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Italy	13.30	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Cyprus	5.00	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Latvia	0.80	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Lithuania	N/A		Not available
Luxembourg	3.90	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Hungary	5.00	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Malta	3.30	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Netherlands	N/A		No reliable data available
Austria	4.00	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Poland	2.20	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Portugal	7.30	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Romania	3.00	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Slovenia	15.70	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Slovakia	2.30	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Finland	3.60	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	
Sweden	N/A		No reliable data available
United Kingdom	3.40	http://www.oiv.int/public/medias/4524/oiv-vine-and-wine-outlook-2012-completfinal.pdf	

Table 50 Orange consumption per capita in kg/year

Country	Kg/capita/year	Reference	Comment
Belgium	4.4	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Bulgaria	0.2	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Czech Republic	N/A		No reliable data available
Denmark	N/A		No reliable data available
Germany	2.8	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Estonia	2.2	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Ireland	2.9	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Greece	N/A		No reliable data available
Spain	N/A		No reliable data available
France	5.3	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Croatia	N/A		No reliable data available
Italy	11.9	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Cyprus	2.6	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Latvia	1.9	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Lithuania	2.0	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Luxembourg	N/A		No reliable data available
Hungary	2.0	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Malta	N/A		No reliable data available
Netherlands	N/A		No reliable data available
Austria	N/A		No reliable data available
Poland	2.5	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Portugal	N/A		No reliable data available
Romania	1.9	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Slovenia	3.2	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Slovakia	3.1	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Finland	5.0	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Sweden	4.7	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
United Kingdom	N/A		No reliable data available

Table 51 Peach consumption per capita in kg/year

Country	Kg/capita/year	Reference	Comment
Belgium	1.66	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Bulgaria	N/A		No reliable data available
Czech Republic	2.00	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Denmark	N/A		No reliable data available
Germany	2.50	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Estonia	0.66	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Ireland	0.53	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Greece	N/A		No reliable data available
Spain	1.60	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
France	2.98	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Croatia	2.50		No reliable data available
Italy	6.34	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Cyprus	N/A		No reliable data available
Latvia	0.9	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Lithuania	0.8	http://ec.europa.eu/agriculture/statistics/agricultural/2013/pdf/c8-1-38_en.pdf	
Luxembourg	2.50	http://ec.europa.eu/agriculture/statistics/agricultural/2013/pdf/c8-1-38_en.pdf	
Hungary	2.90	http://ec.europa.eu/agriculture/statistics/agricultural/2013/pdf/c8-1-38_en.pdf	
Malta	4.30	http://ec.europa.eu/agriculture/statistics/agricultural/2013/pdf/c8-1-38_en.pdf	
Netherlands	1.80	http://ec.europa.eu/agriculture/statistics/agricultural/2013/pdf/c8-1-38_en.pdf	
Austria	4.20	http://ec.europa.eu/agriculture/statistics/agricultural/2013/pdf/c8-1-38_en.pdf	
Poland	N/A		No reliable data available
Portugal	5.50	http://ec.europa.eu/agriculture/statistics/agricultural/2013/pdf/c8-1-38_en.pdf	
Romania	0.90	http://ec.europa.eu/agriculture/statistics/agricultural/2013/pdf/c8-1-38_en.pdf	
Slovenia	1.30	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Slovakia	N/A		No reliable data available
Finland	0.20	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	
Sweden	2.10	http://ec.europa.eu/agriculture/statistics/agricultural/2013/pdf/c8-1-38_en.pdf	
United Kingdom	1.35	https://www.efsa.europa.eu/sites/default/files/acutegdayconsdays.xlsx	

Table 52 Small Citrus Fruit consumption per capita in kg/year

Country	Kg/capita/year	Reference	Comment
Belgium	N/A		No reliable data available
Bulgaria	N/A		No reliable data available
Czech Republic	N/A		No reliable data available
Denmark	N/A		No reliable data available
Germany	N/A		No reliable data available
Estonia	N/A		No reliable data available
Ireland	5.0	http://usda.mannlib.cornell.edu/usda/fas/citruswm/2000s/2009/citruswm-01-14-2009.pdf	
Greece	5.0	http://usda.mannlib.cornell.edu/usda/fas/citruswm/2000s/2009/citruswm-01-14-2009.pdf	
Spain	5.0	http://usda.mannlib.cornell.edu/usda/fas/citruswm/2000s/2009/citruswm-01-14-2009.pdf	
France	5.0	http://usda.mannlib.cornell.edu/usda/fas/citruswm/2000s/2009/citruswm-01-14-2009.pdf	
Croatia	N/A		No reliable data available
Italy	5.0	http://usda.mannlib.cornell.edu/usda/fas/citruswm/2000s/2009/citruswm-01-14-2009.pdf	
Cyprus	5.0	http://usda.mannlib.cornell.edu/usda/fas/citruswm/2000s/2009/citruswm-01-14-2009.pdf	
Latvia	N/A		No reliable data available
Lithuania	N/A		No reliable data available
Luxembourg	N/A		No reliable data available
Hungary	N/A		No reliable data available
Malta	5.0	http://usda.mannlib.cornell.edu/usda/fas/citruswm/2000s/2009/citruswm-01-14-2009.pdf	
Netherlands	5.0	http://usda.mannlib.cornell.edu/usda/fas/citruswm/2000s/2009/citruswm-01-14-2009.pdf	
Austria	N/A		No reliable data available
Poland	N/A		No reliable data available
Portugal	N/A		No reliable data available
Romania	N/A		No reliable data available
Slovenia	N/A		No reliable data available
Slovakia	N/A		No reliable data available
Finland	5.0	http://usda.mannlib.cornell.edu/usda/fas/citruswm/2000s/2009/citruswm-01-14-2009.pdf	
Sweden	5.0	http://usda.mannlib.cornell.edu/usda/fas/citruswm/2000s/2009/citruswm-01-14-2009.pdf	
United Kingdom	N/A		No reliable data available