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Survey of pesticides in flowers from countries outside the EU
- Preliminary project

Survey of chemical substances in consumer products No. 188

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1. Preface

The objective of this report is to analyse and describe which pesticides are used in the production of flowers in countries outside the EU, and which pesticides might end on the Danish market via the products. It has been difficult to obtain information about flower production outside the EU, and therefore the results are based on various accessible sources. Literature retrieval, market investigations via questionnaires, and interviews were used for this project. In addition, information was retrieved from Satistics Denmark and Eurostat. Finally, various authorities outside the EU were contacted.

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2. Summary and conclusions

Background and objective
Within flower production, several pesticides are used, i.a., to control pests and plant diseases. Pesticides used in the production of flowers are approved at national level. The objective of this project is 1) to shed light on which pesticides are used in the production of plants in countries outside the EU, and 2) to obtain an overall view of the existing knowledge about the content of pesticide residues in flower products that are imported from other countries. This project focuses on products such as cut flowers, potted plants, and flower bulbs that are intended to be used by the consumer.

Pesticides in the flower production
In the survey of pesticides used in the production of flowers in countries outside the EU, inquiries were sent to the national pesticide authorities in 19 chosen countries outside the EU. The chosen countries had in 2020 the largest registered export to the Netherlands and Germany, which are the two main import countries for Denmark. The result of the inquiries was that two out of 19 countries forwarded an outline of the pesticides that are approved for flower production. A review of the approved pesticides showed that app. half of the pesticides are not approved in the EU, and therefore they are not approved in Denmark. The survey from the two countries outside the EU identified 43 active substances that are not approved in the EU.

To obtain permission to import flower products to the EU, many demands are made to plant health in order to ensure that pests or plant diseases are not imported to the EU. Therefore, it might be necessary to ensure that certain plants are free from certain harmful organisms which again might result in the use of pesticides that are not permitted in the EU. Certification schemes can contribute to a limited use of specific pesticides in flower products by blacklisting several active substances.

Pesticide residues in flowers
Several published studies that directly concern the occurrence of pesticide residues in flower products have been identified. Most recently (in 2020), a Danish study regarding cut flowers was carried out. Studies demonstrated a considerable number of pesticides and large amounts were found in flower products. Concentrations exceeding 35 mg/kg were found for one single pesticide, and 140 mg/kg was found for the sum of all detected substances in one product. That means, that substances prohibited in the EU were detected. In European legislation, no limit values exist for content of pesticides in flower products. On the other hand, limit values determined by the individual retail trade exist, but they are not shared by the entire retail trade. That is for instance the case in Germany, the Netherlands, and Belgium.

Production and imports
The production of flowers and plants can take place in countries outside the EU. That, e.g., goes for finished goods such as cut flowers or semi-manufactured products such as cuttings that are imported to the EU where cuttings are processed. The Netherlands account for major imports to the EU, and they also have widespread business relations with the EU countries. It is difficult to obtain data showing how many of the flower products sold on the Danish market are produced in countries outside the EU. There are two reasons for that – namely, the mentioned trade route and the lacking registration of imports from the actual country of origin. Statistic data from Statistics Denmark and Eurostat indicate that especially cut flowers are produced outside the EU. Literature shows that for instance African countries are large-scale manufacturers of cut flowers such as roses. That was confirmed through interviews with the Danish retail trade.

Cuttings comprise a minor part of the flower products that are imported to Denmark (160.000 tons in 2020), and after being processed they might end as export goods. Through intermediaries, other products can end up in companies or among professionals, but not necessarily among consumers.

Total assessment

In conclusion, it is probable that pesticide residues might be found in flower products that are imported to the consumers on the Danish market. Which pesticides are in question, depends on the manufacturer and the country of origin. The consumer is not necessarily informed about the manufacturer and country of origin when purchasing a flower product. In addition, data regarding which countries have approved certain pesticides is not always easily obtainable. The content levels of residue concentrations may be high, and therefore they might constitute a risk for florists who daily handle flower products for several hours. In comparison, the consumers will be exposed to much lower residue concentrations of pesticides in flower products, and they will not necessarily constitute a risk.

3. Introduction

3.1 Background

A wide range of pesticides are used in the production of flower bulbs, cut flowers, and potted plants. The plants are often produced outside the EU, and it is rather uncertain which pesticides are used and which plants are sold on the Danish market via the plant manufacturers. It is probable that pesticides not approved for use in the EU have been used. Therefore, the Danish Environmental Protection Agency wants to identify and analyse which pesticides are used and which possible residues the products contain.

3.2 Objective

The overall objective of this project is to analyse and obtain information about which pesticides are used to produce plants and associated products outside the EU, and which the Danish consumer may be exposed to. In addition, the objective is to map out from where and to which degree the products are imported.

3.3 Method

Information about which pesticides are used in the production of flowers in countries outside the EU is not very accessible. Therefore, it was investigated to which degree information can be obtained about which pesticides are approved (and possibly used) in which countries, and thereby uncover which pesticide residues are used in the production of flowers imported from countries outside the EU.

The study of which pesticides are used to produce flowers and associated products outside the EU was literature-based and carried out by searching on the internet in combination with inquiries to the national authorities in primary export countries of flower products. The export countries were chosen in the light of statistic data on flower products that probably are imported to Denmark via the Netherlands or Germany. Interested parties were involved so further information could be obtained through interviews.
Information retrieval about pesticide residues in flower products was mainly literature-based and took place as general internet searches. As a starting point for the literature search, the search words ’pesticides’ and ’flowers’ were used simultaneously in various combinations. In addition, references to other literature were used. Selected European laboratories were contacted to search for non-published material.

The survey concerning from where and to which degree flower products are imported was carried out by using databases from Statistics Denmark and Eurostat. Supportive, literature-based searches were used. Statistic data concerning the import of flower products was accessed via Statistics Denmark, StatBank Denmark, regarding import to Denmark. Information regarding tonnage can be subject to some uncertainty, e.g., if the value of the product codes was used. Statistic Denmark states the country of dispatch. If import take place directly from a country, e.g., outside the EU, then the country is stated as the country of origin in StatBank Denmark. If a product comes from a third country, but before import is cleared for instance in an EU country, then it will in Statistics Denmark appear as an imported product from an EU country, and then the country of origin can no longer be traced. That means, that Statistics Denmark can register import from an EU country although the flower products originate from a third country, e.g., a non-EU country. In connection with imports to the EU, statistic data was received from Eurostat, and the same reservations must be made as for data from StatBank Denmark.

A market investigation was carried out by using a questionnaire forwarded to flower shops, nurseries, and greenhouse horticultural markets. Interviews were also carried out in the retail trade, and they take their point of reference in a questionnaire forwarded to flower shops, nurseries, the horticultural sector, and importers. The questionnaire and the interview framework comprises questions focusing on which knowledge the distributors have about flower products imported from countries outside the EU, product types, and their knowledge about pesticide residues in flower products.

4. Pesticides in flower production

4.1 Pesticides approved for flower production

Flower products are grown outdoors as well as in greenhouses. Greenhouse horticultural markets are used for several different sub-products. Ornamental plants, e.g., potted plants, are grown for indoor use. A greenhouse for flower production is considered a closed system[1], which is of importance for the approval of pesticides to be used in a greenhouse. That means, that several pesticides that may be used in greenhouses are not approved for use in productions grown outdoors, and therefore, pesticide residues must not be released to the environment via for instance composting.

Getting a pesticide approved places demands on the use regarding for instance correct handling and dosage. In Denmark, the Danish Agricultural Agency controls the use of pesticides in greenhouses. The Danish interest group called *Danish Horticulture* advises greenhouses on the correct pesticide dosage.

The approval of pesticides takes place at national level. For countries within the EU it is assumed that a pesticide active substance is approved at European level. All approved pesticide products and active substances on the Danish market are registered in the Danish EPA Pesticide database (BMD), which is accessible to the public. The database for instance has information about the objective of the application (insecticide, fungicide, growth regulation, fungi agents). Corresponding data is not necessarily easily obtainable in other countries. An interview with the Danish interest group Danish Horticulture[2] revealed that fewer pesticides are approved in Denmark for greenhouse horticultural markets than in other EU countries. That is, i.a., due to the special focus on clean groundwater in Denmark. Therefore, it is probable that imported flower products from EU countries and countries outside the EU may contain residue concentrations of pesticides that are not approved in Denmark. Kjølholt (2017) reported which pesticides were approved in Denmark in 2016, and which pesticides the Danish Environmental Protection Agency considered most important to use in Danish greenhouses.

Homologa®[3] is a global plant protection products database, and according to their official homepage the database contains detailed information about registered plant protection products and their maximum residue limits. The plant protection products database contains information about new and registered products, expiry dates, active substances, which crops and harmful organisms the approval comprises, and the maximum dose rates. However, access to the database requires membership, and the content of the database and quality of the data have not been further investigated.

[1] In the Pesticide Regulation (1107/2009/EC) a “greenhouse” means a walk-in, static, closed place of crop production with a usually translucent outer shell, which allows controlled exchange of material and energy with the surroundings and prevents release of plant protection products to the environment.

[2] Danish Horticulture, department for environment, pesticides, plant health, foodstuffs. Personal communication.

[3] https://homologa.com

4.2 Approved pesticides outside the EU

An effort was made to identify approved pesticides for flower production in countries outside the EU – countries who are known to export to Denmark, Germany, and the Netherlands. That is because the trade route to a high degree goes through other EU countries such as the Netherlands. Statistic data of import of flower products give an impression of which countries are leading within import to the EU (see chapter 6.4). 19 countries outside the EU with an export of flower products to the EU exceeding 2000 tons were chosen from the statistical data. In addition, the import from these countries exceeds 6 million DKK. The 19 countries are stated in TABLE 1.

TABLE 1. Countries from which an attempt was made to collect information about approved pesticides in flower production.

Kenya
China
Uganda
Costa Rica
Guatemala
Tanzania
Ethiopia
Honduras
Turkey
North Macedonia
Ecuador
Colombia
South Africa
Zambia
Rwanda
Thailand
Malaysia
The Philippines
Zimbabwe

An attempt was made to collect information about which pesticides are approved for use in flower production in the 19 selected countries outside the EU that export products to the EU. As the approval of a pesticide takes place at national level, contact was taken to the pesticide approving authorities – first by contacting the embassies of the relevant countries. In most cases, the inquiry was passed on to the authority in question. Alternatively, the embassy forwarded the contact information of the authority in question and then an inquiry could be sent to the authority. In a few cases, it was possible to use a contact form from the homepage of the embassy or other institution.

Information was received from two out of the 19 countries who were asked which pesticides are approved for use in flower production. Malaysia was one of the countries, and their list of approved pesticides appears in Appendix 1.1. In total, the list contains 314 different pesticide products, for which the use and the active substance(s) have been informed. If a closer look only is taken at the active substances, then there is a total of 75 approved active substances (TABLE 2). One of the active substances (whiteoil) was not identified in the EU pesticide database[4]. For the remaining active substances, the database shows that 36 out of the 74 active substances are not approved in the EU. The substances in question are stated in

[4] The EU pesticide database https://ec.europa.eu/food/plant/Appendix 1.1pesticides/eu-pesticides-db_en, accessed 25 September 2021.

TABLE 2. If an active substance previously was approved in the EU, then there might be a period of transition for phasing-out the relevant active substance (max. grace period). The phasing-out dates of the active substances are stated in TABLE 2.

Information on pesticides approved in the Philippines for use in the production of ornamental plants was also retrieved by contacting the authorities in the country in question (TABLE 3). The list is limited to a total of 11 active substances that are reported with details concerning use in Appendix 1.2 (sulphur and elemental sulphur are considered the same active substance). It appears from the EU pesticide database that seven out of 11 active substances have status as not approved in the EU. Two out of 11 active substances do not exist on the list of approved active substances for use in the flower production in Malaysia. That is the case for diazinon and fenitrothion.

TABLE 2. Active substances approved in the flower production in Malaysia.

No.	Active substance approved in Malaysia	Status EU database	Comment
1	Abamectin	Approved	
2	Amitraz	Not approved	
3	Azadirachtin (margosa extract)	Approved	
4	Azoxystrobin	Approved	
5	Benalaxyl-m	Approved	
6	Benomyl	Not approved	
7	Bifenthrin	Not approved	
8	Buprofezin	Approved	
9	Captan	Approved	
10	Carbaryl	Not approved	
11	Carbendazim	Not approved	Phasing-out period up to 31/05/2016. (Max. grace period)
12	Carbosulfan	Not approved	
13	Chlorfenapyr	Not approved	
14	Chlorothalonil	Not approved	Withdrawn 20 November 2019, Phasing-out period up to 20 May 2020. (Max. grace period)
15	Clothianidin	Not approved	
16	Copper hydroxide	Approved	
17	Copper oxychloride	Approved	
18	Cymoxanil	Approved	
19	Cypermethrin	Approved	
20	Cyromazine	Not approved	
21	Dazomet	Approved	
22	Deltamethrin	Approved	
23	Diafenthiuron	Not approved	
24	Difenoconazole	Approved	
25	Diflubenzuron	Not approved	
26	Dimethoate	Not approved	Withdrawn 31 December. Phasing-out period up to 30 September 2019 for cherries, 30 June 2020 for other crops. (Max. grace period)
27	Dimethomorph	Approved	

No.	Active substance approved in Malaysia	Status EU database	Comment
28	Epoxiconazole	Not approved	
29	Esfenvalerate	Approved	
30	Famoxadone	Not approved	Phasing-out period up to 16 September 2022 (Max. grace period)
31	Fenpyroximate	Approved	
32	Fipronil	Not approved	
33	Flufenoxuron	Not approved	
34	Fluopyram	Approved	
35	Flutolanil	Approved	
36	Flutriafol	Not approved	
37	Glufosinate	Not approved	
38	Hexaconazole	Not approved	
39	Hexythiazox	Approved	
40	Imidacloprid	Not approved	
41	Iprodione	Not approved	
42	Kresoxim-methyl	Approved	
43	Lambda-cyhalothrin	Approved	
44	Malathion	Approved	Application only as insecticide in greenhouses. Withdrawn 29 April 2019. Phasing-out period up to 29 January 2020. (Max. grace period)
45	Mancozeb	Not approved	Withdrawn 4 July 2021. Phasing-out period up to 4 January 2022. (Max. grace period)
46	Metalaxyl	Approved	
47	Metaldehyde	Approved	
48	Metiram	Approved	
49	Metominostrobin	Not approved	
50	Myclobutanil	Not approved	
51	Pendimethalin	Approved	
52	Phosmet	Approved	
53	Propamocarb	Approved	
54	Propiconazole	Not approved	Phasing-out period up to 19 March 2020. (Max. grace period)
55	Propineb	Not approved	Withdrawn 22 June 2018. Phasing-out period up to 22 Jun 2019. (Max. grace period)
56	Pyridaben	Approved	
57	Pyriproxyfen	Approved	
58	Spirodiclofen	Not approved	Prolongation of temporary permission (2009/579)
59	Spiromesifen	Approved	
60	Sulphur	Approved	
61	Tebuconazole	Approved	
62	Tetraconazole	Approved	
63	Thiamethoxam	Not approved	
64	Thiocyclam	Not approved	
65	Thiophanate-methyl	Not approved	Withdrawn 19 April 2021. Phasing-out period up to 19 October 2021. (Max. grace period)

No.	Active substance approved in Malaysia	Status EU database	Comment
66	Thiram	Not approved	Withdrawn 30 January 2019. Phasing-out period up to 30 April 2019 for use on leaves and 30 January 2020 for other application. (Max. grace period)
67	Tolclofos-methyl	Approved	
68	Triadimefon	Not approved	
69	Tribasic copper sulphate	Approved	
70	Tridemorph	Not approved	
71	Trifloxystrobin	Approved	
72	Triforine	Not approved	
73	Whiteoil	-	Not identified in the database
74	Zineb	Not approved	
75	Zoxamide	Approved	

TABLE 3. Active substances approved in the production of ornamental plants in the Philippines.

No.	Active substance approved in the Philippines	Status EU database	Comment
1	Captan	Approved	
2	Chlorothalonil	Not approved	Withdrawn 20 November 2019. Phasing-out period up to 20 May 2020. (Max. grace period)
3	Elemental sulphur	Approved	Identical with sulphur
4	Mancozeb	Not approved	Withdrawn 4 July 2021. Phasing-out period up to 4 January 2022. (Max. grace period)
5	Propineb	Not approved	Withdrawn 22 June 2018. Phasing-out period up to 22 June 2019. (Max. grace period)
6	Sulphur	Approved	
7	Thiophanate-methyl	Not approved	Withdrawn 19 April 2021. Phasing-out period up to 19 October 2021. (Max. grace period)
8	Abamectin	Approved	
9	Carbaryl	Not approved	
10	Diazinon	Not approved	
11	Fenitrothion	Not approved	
12	Malathion	Approved	Application only as insecticide in greenhouses. Withdrawn 29 April 2019. Phasing-out period up to 29 January 2020. (Max. grace period).

Information from the two countries shows that pesticide products that are not approved in the EU and therefore not in Denmark may have been used for flower production outside the EU. This project identified 43 active substances that are not approved in the EU.

5. Pesticide residues in flowers

5.1 Residue concentrations of pesticides in flower products

The purpose of using pesticides in the production of flowers can differ. Fungicides combat the unwanted growth of fungi; herbicides combat weeds, and insecticides can prevent insect attacks. In addition, growth inhibitors might be used to regulate the growth of plants, e.g., size and density. A pesticide product can also contain subsidiary substances (safeners, synergists, or co-formulants) that do not form part of this project.

Pesticides are used in different stages of a production. A pesticide that is sprayed can be absorbed in plants, and if the pesticide is not decomposed in the growth phase or during transportation, then there might be residue concentrations of the pesticide in the finished flower product. As several different pesticides might have been used in the production, it is possible that more than one pesticide is found in the products.

Exporting flower products to the EU requires authorisation. To obtain an authorisation a risk analysis must be carried out on the product regarding which plant diseases or pests (see chapter 6.5) the plant might get attacked by as harmful organisms must not be imported to the EU. Therefore, it might be necessary to make demands for treatment with a specific pesticide before exporting to avoid exporting plant diseases or pests. The used pesticides can be - but are not necessarily - approved in the EU. If treatment with a pesticide takes place immediately before export from a country outside the EU, then it may be probable that the pesticide (or metabolites of the pesticide) is found in residue concentrations on or in the plant when it is exported from countries outside the EU and into the EU, including Denmark.

Pesticide residues in feed or foodstuffs are one of the most regulated areas within food safety. The EU has determined maximum residue levels (MRLs) of the residue content of pesticides in foodstuff. The maximum residue levels and import tolerances of active substances in pesticides are determined in the so-called pesticide framework regulation - Regulation (EC) 396/2005 dated 23 February 2005.[5] By comparison, there are no corresponding residue levels of pesticides for flower products that are not classified as foodstuff or as organic. Pesticides that may be used in greenhouses may be approved with the assumption that the pesticide is not released to the environment. Therefore, greenhouses in Denmark must ensure that composting of plant waste, e.g., takes place in containers with collection of drainage water as there might be a risk of pesticide seepage to the groundwater.

The residue content of pesticides in foodstuffs can be determined by chemical analyses. Correspondingly, chemical analyses can be carried out on flower products for content of several pesticides. In the following chapters several studies are introduced. They were carried out to study the residue concentration level of pesticides in flower products. It should be noted that the residue concentrations of pesticides found in the relevant studies only show which pesticides were used in the production when the studies were published.

5.1.1 Nordic studies

In connection with the project *"Handling plant waste with a content of pesticides and decomposition of pesticides in composting and biogas plants"* carried out by the Danish Environmental Protection Agency (Kjølholt et al., 2016), several studies on the discovery of residue concentrations of pesticides from greenhouse production are referred to and reported in this report – especially in cases where potted plants and cut flowers were analysed.

[5] https://www.foedevarestyrelsen.dk/Leksikon/Sider/Sproejtemidler.aspx

Roseth (2010) investigated pesticide residues in potted plants and cut flowers (all roses), produced in Norway as well as imported - 23 samples in total (17 potted plants, five cut roses and one flower bulb). Pesticide residues were detected in 18 of the 23 plant samples and a total of 59 active substances, of which 34 were insecticides and 25 fungicides. Of the five samples without a pesticide content, four were potted plants (one produced in Norway and three where the country of origin had not been investigated), whereas the fifth was flower bulbs produced in the Netherlands. Most of the positive potted plant samples only contained one or few pesticides, whereas nine active substances were detected in the sample with most pesticide residue (one solanum imported from Denmark). Pesticide residues were detected in all samples of cut roses and a substantial number of substances were detected in all imported flowers (three from Africa and one with no stated country of origin), whereas a rose produced in Norway only contained residue from two active substances.

In the 17 investigated potted plants with pesticide residue, the total residue concentrations were generally somewhat below 1 mg/kg, but two potted plants (both imported from Denmark) showed concentrations of single substances above 1 mg/kg wet weight (3.9 mg/kg endosulfan in one (solanum) and 2.6 mg/kg pirimicarb in the other ("ildtopp")) and total concentrations of 7.0 and 3.6 mg/kg wet weight, respectively. It was noted that the substance endosulfan is not approved for use in Denmark or the EU, and therefore it must be assumed that the two potted plants from Denmark had been imported to Denmark as cuttings from a completely different third country. The most burdened cut rose, in which 12 different active substances were found, had a total pesticide content of 14.4 mg/kg wet weight, of which 5.1 mg/kg was spiroxamine and 3.8 mg/kg was cypermethrin. In another rose sample, 21 active substances were detected, but no single substance was higher than 1.3 mg/kg (fenamidone).

In general, there was a wide variation in the pesticides that were detected in the various samples of potted plants and flowers. None of the 21 active substances detected in potted plants appeared in more than two samples. Among the 33 substances that were detected in cut roses only fluzilazol, hexythiazox and spiroxamine appeared in four samples, whereas boscalid, cypermethrin, and difenoconazol were found in three samples and the rest only in one or two samples.

Jensen, C.R., et al. (2020) carried out a study of the adverse environmental and health effects of the demand for cut flowers. Analyses were carried out on eight bouquets purchased in Denmark and representing different manufacturers and countries of origin. Certified as well as non-certified products were chosen. A content of propiconazol was detected in nearly all samples in concentration levels of 6-35 mg/kg. Dimethoat, diazinon, chlorpyrifos, chlorfenvinfos, carbaryl, iprovalicarb, boscalid, and picoxystrobin were found in fewer bouquets (0.0001-11 mg/kg). Added to that comes 10 unknown substances in concentrations of up to 280 mg/kg. An analysis of salal[6] (used as “decorative greenery” in a bouquet) detected propiconazol (140 mg/kg) and five unknown substances. The pesticide concentrations found in each bouquet were summed up and gave a total concentration of 7-140 mg active substances per kg plant material. Of the identified active substances, four are fungicides and five are insecticides. Pesticide residues were detected in roses from the Netherlands and Kenya, but due to the limited statistic material it was not possible to estimate if there is a difference in the concentrations. The report concludes that imported cut roses contain pesticide residues, and all identified active substances except for one single substance are not approved in Denmark. Certified roses as well as non-certified roses contained pesticide residue.

5.1.2 Studies in other countries

Several studies that comprise analyses of flowers and flower products for content of pesticide residues demonstrate that the high residue concentrations in flower products have been known for decades. The studies focus on different items, and therefore different types of flowers have been analysed. The concern that pesticide residues found in plants can harm bees, resulted in studies that investigate the residue concentration level of pesticides in plants to which bees are particularly attracted. Pesticides known to

[6] Bushy mountain tea, Gaultheria shallon

harm bees were measured, and other pesticides were also measured. The studies are further described in the following paragraphs.

Morse et al. (1979) investigated flowers imported to the American market for content of pesticides. Due to legislation that intends to prohibit import of pests and plant diseases, imported flowers received intensive pesticide treatment before transportation. 105 flowers from 43 different manufacturers, mainly from Colombia, were analysed.

A study by Richard Wiles, Vice President of Research for the Environmental Working Group (EWG 1997), analysed roses and found that roses from California had a content of pesticides that was 1000 times higher compared with the content in foodstuffs.[7] Iprodione was also detected, and it has been demonstrated that it causes cancer in mice.

Taube et al. (2002) ascertained that the levels of pesticides in ornamental plants/flowers could exceed 1 mg/kg wet weight and especially demonstrated high levels of dicofol, dodemorph and methiocarb (all above 1 mg/kg wet weight with the highest concentration of 1.6 mg/kg wet weight for dicofol). Other substances detected in parts of ornamental plants were captan, chlorothalonil, dichlorvos, iprodione, metalaxyl, and methidathion and a very low content, i.e., 0.01 mg/kg wet weight or less of DDE, endosulfan, malathion, phosalon, procymidone, pyrazophos, and vinclozolin. Kjølholt (2016) ascertained that a considerable number of the detected active substances in the study by Taube et al. (2002) are active substances and their use is prohibited in the EU. Therefore, Kjølholt (2016) assumed that the relevant results are due to imported plants or locally produced plants for which cuttings from countries outside the EU have been used. However, some of the substances were presumably still on the EU market at the time of the investigation.

Toumi et al. (2016-2019) reported studies with cut flowers where the content of pesticide residues was investigated. Those studies analysed flowers from countries outside and inside the EU. That is because florists in their daily work to a high degree handle plants and flowers, and therefore they are to a higher degree exposed to pesticide residues compared with a common consumer. The analyses reported by Toumi (2017) reflect the intensive use of fungicides on cut flowers in general. As the flowers are susceptible to fungi diseases, they are regularly treated until they are harvested. The high levels of fungicide residue in gloves used by the florists are related to high amounts of pesticides but also to repeated spraying during the growth season. The results of this study showed that boscalid was the active substance for which the highest maximum and average concentrations (26.21 and 3.47 mg/kg, respectively) were measured on the glove samples.

The study of various cut flowers (produced in and outside the EU) that usually are sold in Belgium (2016) showed a content of pesticide residues. In total, 107 different active substances were detected, and they are listed in the article. Roses turned out to contain most substances. There was no indication that countries outside the EU use more or fewer pesticides in the production. The fungicides called dodemorph, propamocarb, and procymidone had the highest concentrations (41.9, 35.4 and 35.3 mg/kg). Procymidone is not approved in the EU. Regardless of country of origin, a content of pesticide was found that is not approved in the EU.

In a study on pesticide residues in ornamental plants for use in English gardens and parks (Lentola et al., 2017), 27 out of 29 plants were identified to have pesticide residues in the leaves (2017). The investigated active substances were chosen according to what is believed to be harmful to bees. The study does not state the country of origin of the analysed plants.

[7] The study was not accessible but is referred to in two www-documenter, accessed 26 April 2021:
July 2004, The environmental magazine, *Dangerous Beauty*
Joby Warrick, 1 June 2000, *Pesticides and Cut Flowers, Fresh cut flowers: fragrant, beautiful and often doused with pesticides*

In a study from 2014 carried out by Reuter, W. et al. (2014), 10 European countries analysed 35 different ornamental plants that bees find attractive. Among others, three neonicotides (thiamethoxam, chlothianidin, and imidacloprid), that have a limited use in the EU, were identified in plant tissue. Pesticides that are not known to be harmful to bees were also detected. 12 out of 86 analysed plants contained pesticides that were not approved for use in the EU in 2014. The findings can be due to illegal use or import of semi-manufactured products (young plants) from non-EU countries. When the article was published in 2014, 10 of the found pesticides were not approved in the EU. The approval status of the identified pesticides in the EU pesticide database[8] was investigated, and it turned out that further 15 pesticides would no longer be approved in the EU.

5.1.3 Limit values of residue concentrations of pesticides

A questionnaire survey was carried out to investigate if analyses of pesticide residues are carried out in flower products, as the EU has no fixed maximum residue limits (MRL) for residue content of pesticides in finished flower products. The interviewees comprised selected authorities and laboratories in the EU. A total of 28 questionnaires were forwarded and 18 were returned (64%).

Eight respondents answered that they do not carry out such analyses. Two answered that they carry out analyses of pesticide residues in flowers, and that the analyses include flowers from countries outside the EU. The analyses were carried out for private players and authorities. Three indicate that they know that flower products are inspected with an eye to content of pesticide residues, and two indicate knowledge of national, maximum limits of pesticide residues in flowers. It was not possible to collect further information about specific investigations as confidential information is in question.

Interviews with the interest group called Danish Horticulture[2] show that the retail trade – especially in Germany and the Netherlands – make demands on the residue concentration level of pesticides in imported flower products. That also goes for Danish products. In their own interest, the retail trade in these countries carry out control analyses to ensure that their own requirements are met. Statutory requirements are not in question.

5.2 Exposure to residue concentrations

Having analysed cotton gloves used by florists, Toumi et al. (2017) concluded that florists risk exposure to pesticide residues with a potential health hazard.
Daily, the florists handle many flowers often without using gloves or other protective equipment, although they spend two to six hours a day handling cut flowers and making bouquets. The analyses detected 54 different fungicides corresponding to an average of almost 21 active substances and a total average pesticide amount of 15.53 mg/kg per cotton glove. In connection with the obtained results, Toumi et al. (2017) suggested introducing a maximum limit for residue contents in flowers to reduce the risk specialists in the trade and other people in contact with flowers are exposed to.

The analysis results (chapter 5.1) show that cut flowers and other flower products are possible sources of chemical exposure. If the individual consumer is compared with the florists, then the frequency of exposure is smaller, but exposure is probable during skin contact (Toumi et al., 2017).

Jensen (2020) reported that the calculated dermal exposure of a florist's hands did not exceed the AOEL levels (acceptable operator exposure level) regarding the identified active substances. The report concludes that Danish florists are recommended to wear protective gloves when handling cut flowers, which is not general practice in the trade, and there is still limited knowledge of potential cocktail effects[9] (combination effects due to exposure to several different chemical substances at the same time). In

[8] The EU pesticide database (accessed 26 April 2021). https://ec.europa.eu/food/plant/pesticides/eu-pesticides-db_en

[9] https://mst.dk/kemi/kemikalier/fokus-paa-saerlige-stoffer/hormonforstyrrende-stoffer/cocktaileffekter-og-hormonforstyrrende-stoffer/

addition, it is also stressed that it still is not common knowledge that flowers contain pesticide residues that can run-off.

Which pesticides the consumer potentially can be exposed to depends on from which country the product originates and the product type. It differs from country to country which pesticides have been approved for production. Pesticides that are used to prevent, e.g., fungi diseases are used in high concentrations and repeatedly up to harvesting, i.a., to ensure that healthy plants are imported to the EU (chapter 6.5). It is likely to find higher concentrations of the pesticides that originate from pre-transportation crop spraying.

6. Production and import of flower products

6.1 Country of origin

Flower products are often produced outside the EU. Several studies on pesticides in the flower production have been identified, and over the years the following have been published: (Stimamiglio, 1998; Del Prado-Lu, 2007; Fabián, 2013; Mengistie, 2016; Mwabulambo, 2018). The studies mention that specific countries outside the EU (TABLE 4) export flower products.

Rikken (2010) reported the top 15 export countries of cut flowers. Nine of the countries are stated in TABLE 4 (in italics). In connection with cut flowers, African countries such as Kenya, Uganda, and Ethiopia are stated as leading suppliers to the EU.

TABLE 4. Country of origin outside the EU.

Asia	Africa	South America	Middle East
Thailand	*Kenya*	*Colombia*	*Israel*
Philippines	*Uganda*	*Ecuador*	Turkey
India	*Ethiopia*	Ethiopia	
China	*Zambia*	Costa Rica	
Malaysia	*South Africa*	Peru	
Taiwan	Zimbabwe	Brazil	
	Morocco	Chile	
	Egypt		
	Cameroun		
	Ghana		
	Mauritius		
	Tanzania		

Jensen (2020) reported that the Netherlands account for 10% of the production volume within the flower industry, but for 60% of global exports as the main production of cut flowers is distributed via the Netherlands. Colombia, Kenya, Ecuador, and Ethiopia appear to be the world's largest manufacturers of roses.

6.1.1 Production of semi-manufactured goods

Countries outside the EU also make semi-manufactured goods such as cuttings, and they are imported to the EU for breeding. Pesticides used for producing such semi-manufactured goods can possibly be found in residue concentrations in the final product. Therefore, residue concentrations of non-approved pesticides might be found if cuttings from a country outside the EU have been used.

In a report from 2015, Löfkvist et al. state that 4-11 active substances were found in the compost samples from Swedish greenhouses, and that chlormequat-chloride was the most frequently occurring substance. The levels are described as rather low but the active substance that was found in the highest concentrations was chlorothalonil - a fungicide that has been prohibited in Sweden since 1990. The discovery was probably due to a content in the growth medium from minor plants imported from abroad for

further growing in Sweden. Only recently, chlorothalonil has stopped being approved in the EU. The approval was withdrawn on 20 November 2019 with a phasing-out period up to 20 May 2020.

6.2 Flower categories – The Combined Nomenclature

The EU goods nomenclature was used to search for information about specific products that are imported to European countries. The nomenclature, which especially is aimed at people who have a duty to disclose when trading within the EU, contains the complete CN (the Combined Nomenclature) and the connected supplementary units that fulfil the requirements to statistics of foreign trade.

Flower products and the like are stated in chapter 6 in the EU goods nomenclature (TABLE 5). The chapter has four categories that are identified with a three-figure code. In TABLE 5, each category has received a simplified description that is used to refer to the category. Each of the four categories have a sub-category that is described in Appendix 2.1. Semi-manufactured goods such as cuttings belong to the category called living plants (CN code 602).

TABLE 5. The EU goods nomenclature for flower products.

Living trees and other living plants; bulbs, roots and similar; cut flowers and leaves (chapter 6 in the EU goods nomenclature)		
Category	**Simplified designation**	**CN code**
Bulbs, roots, and tubers, also in growth or bloom, and chicory plants and roots (except for edible bulbs, roots and tuberous roots and chicory roots of the type "Cichorium intybus sativum")	Bulbs and similar	601
Living plants, including living roots and cuttings, scions, and mycelium (except for bulbs, root and tubers, rootstocks and rhizomes and chicory plants and roots)	Living plants	602
Cut flowers and flower buds of the type used for bouquets or ornamentally, fresh, dried, bleached, dyed, or prepared in other ways	Cut flowers	603
Leaves, branches and other plant parts without flowers or flower buds and grass, moss and lichen of the type that is used for bouquets or ornamentally, fresh, dried, bleached, dyed, impregnated, or prepared in other ways	Plant parts	604

6.3 Import of flower products to Denmark

To investigate the import of flower products to Denmark, data from StatBank Denmark was used by employing the Combined Nomenclature that can be found in chapter 6 of the EU goods nomenclature. Tonnage of products is registered in StatBank Denmark with regard to import country. Therefore, it should be noted that although a product is imported from another EU country, then the product can still be manufactured in a country outside the EU.

In all, 52 import countries were registered for the total import of flower products to Denmark in 2020. (Appendix 2.2). Of these countries, 20 countries with largest imports to Denmark account for more than 99% of total imports (tonnage) to Denmark. Import figures for 2016-2020 in these 20 countries appear I TABLE 6. Merely four out of the 20 primary countries that export goods to Denmark are countries outside the EU, and they are China, Thailand, Honduras, and Guatemala. These four countries account for less than 1% of the total tonnage of imported flower products. In five years, China has increased its export of flower products to Denmark more than tenfold.

TABLE 6. Total imports from the 20 primary exporting countries of flowers to Denmark stated in tons annually.

Country	2016	2017	2018	2019	2020
The Netherlands	49807	50286	49822	58754	66308
Germany	18781	17385	18354	19103	58721
Poland	4221	7460	9380	5326	12669
Belgium	6517	1394	2228	4472	5681
Italy	5125	6060	2837	4933	4085
Sweden	816	1986	896	859	3465
Lithuania	266	323	326	1134	1293
Spain	691	710	558	847	1157
France and Monaco	393	388	335	366	975
Great Britain	897	1236	1109	1781	923
Portugal	162	337	994	468	677
China	56	465	468	589	611
Honduras	60	274	444	541	451
Thailand	430	508	472	440	445
Turkey	49	75	91	130	403
Estonia	66	175	143	203	375
Finland	151	673	699	226	334
Rumania	2	1	67	5	293
Guatemala	216	537	123	210	202
The Czech Republic	70	404	626	612	186

Source: Statistics Denmark, © www.statistikbanken.dk/KN8MEST

Import figures from 2016-2020 (TABLE 6) show that the Netherlands and Germany are the two largest import countries, and in total they account for 78% of all imports of flower products to Denmark amounting to 160.000 tons. Germany has experienced a threefold increase in imports from 2019 and 2020. The same goes for Poland during a period of five years. In the light of the import figures from 2020, FIGURE 1 shows the total tonnage between eight countries that have exported more than 1000 tons to Denmark. Imports from the other 44 countries have been added up and account for app. 4% of total imports in 2020. See chapter 6.3.1 for closer clarification of how the product types are distributed for flower products imported in 2020.

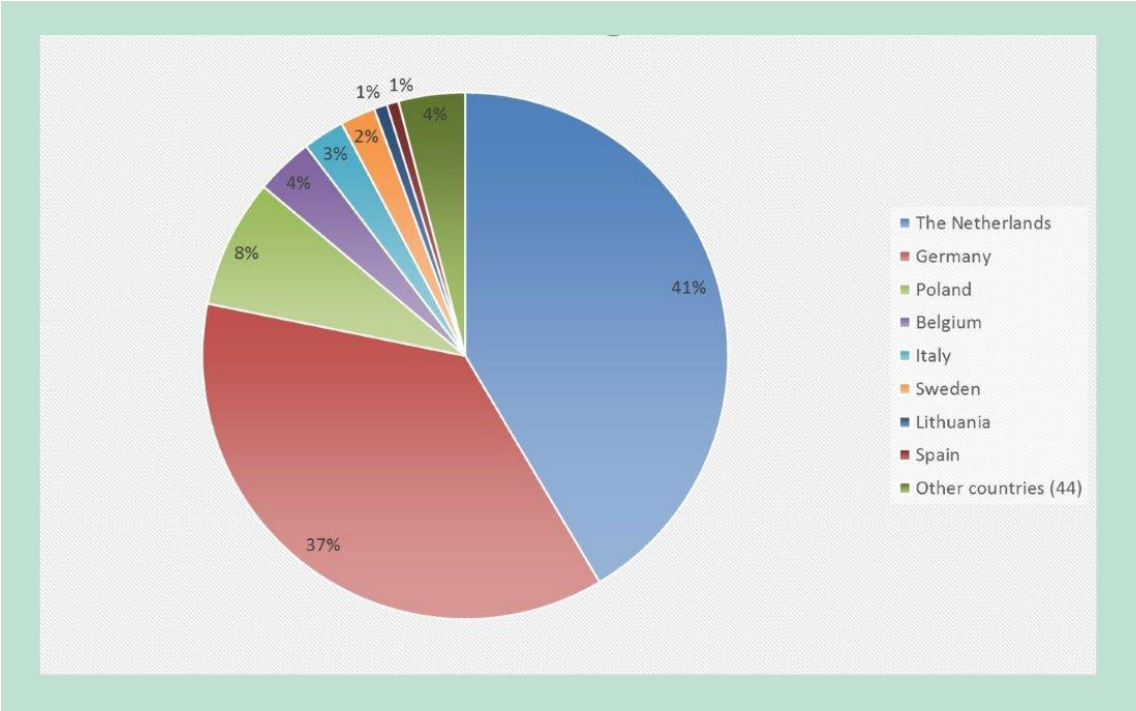

FIGURE 1. Total tonnage to Denmark in 2020 of flower products.
Source: Own calculations based on figures from Statistics Denmark.

6.3.1 Imported products

160.000 tons of flower products were registered as imported in 2020, mainly from the Netherlands and Germany (chapter 6.3). If a look is taken at the distribution of the imported flowers among the four product categories identified with a three-digit CN code (FIGURE 2), then it appears that the two main product categories that are imported to Denmark are living plants (602) and cut flowers (603). Import figures (tonnage) of the different sub-categories are shown in Appendix 2.2.

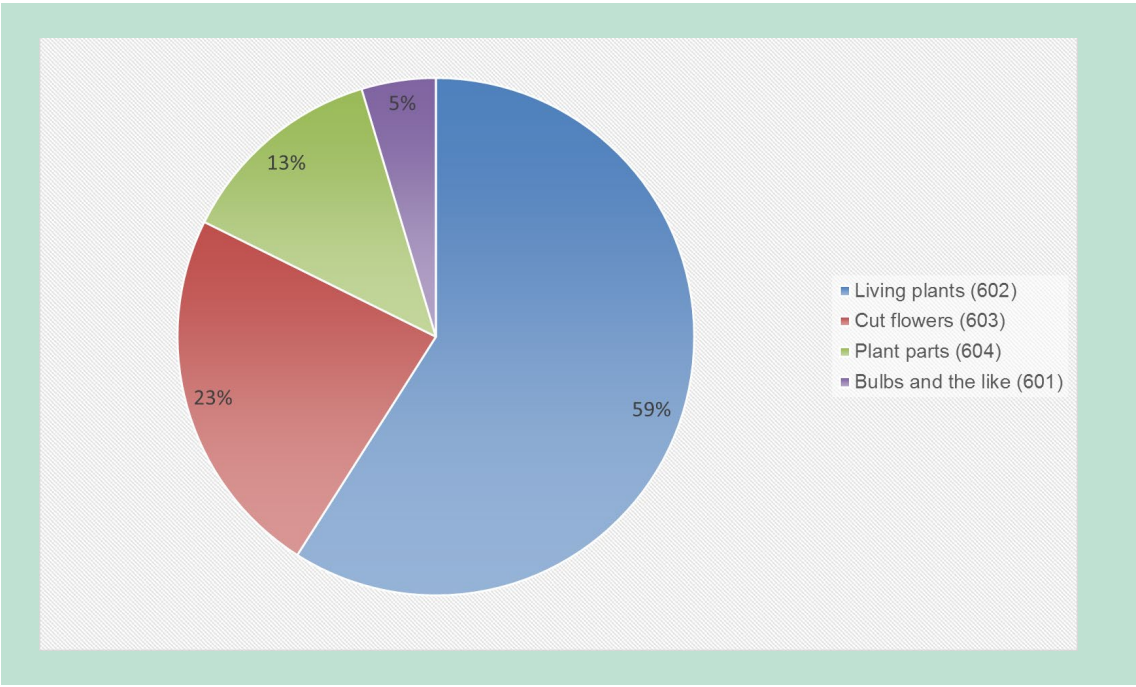

FIGURE 2. Distribution of product categories in 2020 (tonnage).
Source: Own calculations based on figures from Statistics Denmark. Three-digit CN code for each product category is stated in parenthesis.

Cuttings and young plants with roots (from indoor plants, trees, and bushes) belong to the category of living plants. Among these, 6500 tons were imported in 2020, and cuttings of indoor plants amounted to 89%. Cuttings and young plants for breeding in Denmark amount to app. 4% of total imports.

The country of origin of flower products imported to Denmark (Appendix 2.2) is not necessarily identical with the import country. That is because when a product imported from a country outside the EU is declared in another EU country than Denmark, then the EU country in question appears as import country in the statistics. For instance, the Netherlands and Germany are the two main import countries of flower products to Denmark. Simultaneously, the two countries are large importers of flower products produced in countries outside the EU, but the products are to a large extent reexported to other EU countries.

6.4 Import of flower products from countries outside the EU

Rikken (2010) reported that the Netherlands was the leading supplier to EU of cut flowers with 67% of total EU imports. That is due to a considerable production and an efficient auction system for local as well as international products. For the product category of cut flowers, statistic data from Eurostat (FIGURE 3) shows that import takes place to the Netherlands from countries outside the EU (extra-EU import) in an order of magnitude corresponding to 50% of the amounts that are exported from the Netherlands to other EU countries (intra-EU export). In comparison, other similar data for Germany show that exports to other EU countries (intra-EU export) are in the same order of magnitude as imports from countries outside the EU.

The data indicates that a substantial amount of the cut flowers imported from the Netherlands to Denmark may originate from production in countries outside the EU. At the same time, data indicate that the Netherlands play a main part in international trade with flowers.

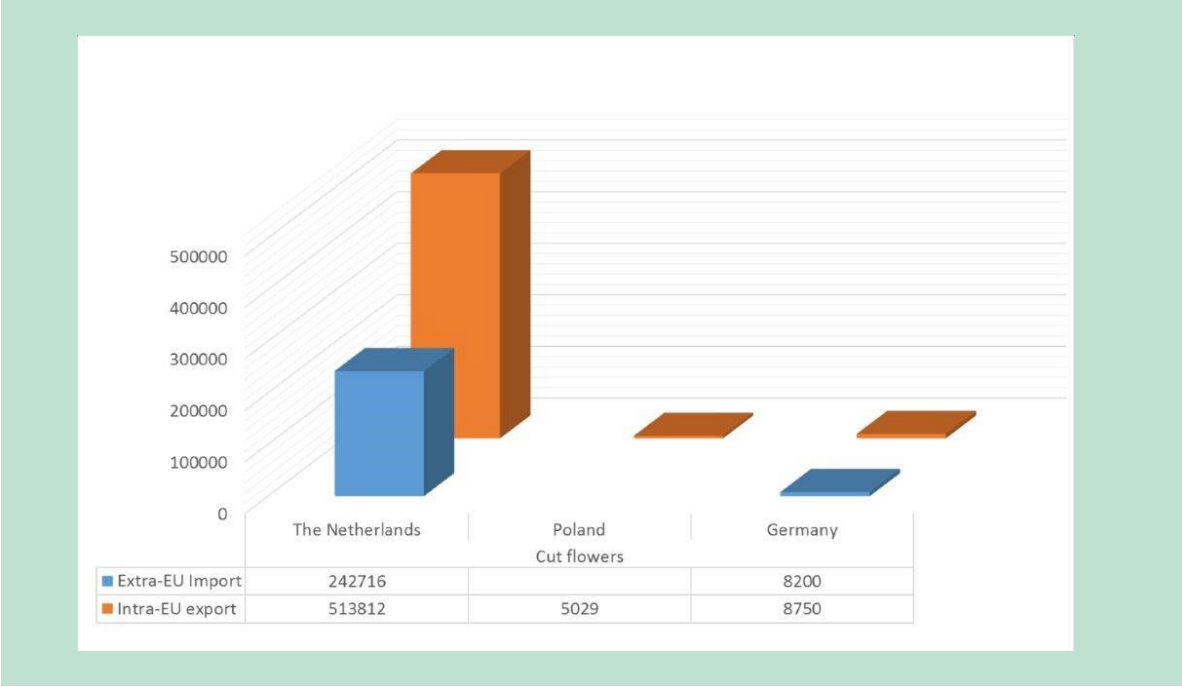

FIGURE 3. Trade with flowers in the Netherlands, Poland, and Germany (2020).
Source: Eurostat.

Data from Eurostat (2020) show that the number of living plants imported from countries outside the EU is much lower than this type of product that is exported to other countries (FIGURE 4). In 2010, Germany was the largest supplier of potted plants (Rikken 2010). Living plants can for instance be cuttings that are imported from countries outside the EU for breeding in an EU country. In the case of Germany and the

Netherlands, statistics show that the difference between extra-EU import and intra-EU import is 20-fold and 200-fold, respectively.

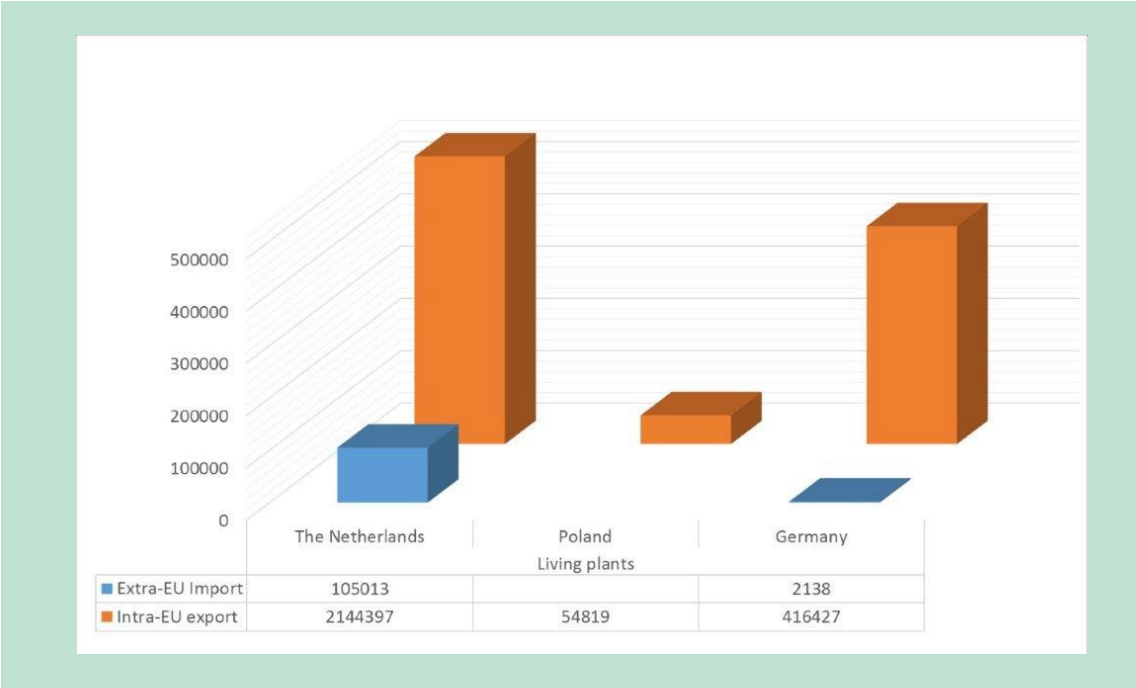

FIGURE 4. Trade with living plants in the Netherlands, Poland, and Germany (2020).
Source: Eurostat.

In 2020, Poland had the third largest import to Denmark, but statistics do not show that direct import took place from countries outside the EU (FIGURE 4). However, the trade route from countries outside the EU probably goes through the Netherlands, who is the largest importer. Therefore, import of flower products from countries outside the EU to Poland will not appear from the statistics.
To a large extent, cut flowers are imported from countries outside the EU, which is confirmed by the retail trade in interviews. It is mentioned that traded cut roses solely are produced in African countries such as Ethiopia. In interviews with the interest group called Danish Horticulture it is mentioned that nearly all cut flowers sold in Denmark are imported goods.

6.5 Phytosanitary certificate and plant passport

The import of living plants to Denmark/EU requires control of selected plant diseases and pests, cf. the plant health regulation 2016/3031. The regulation came into force on 14 December 2019. The requirements are among others due to increased focus on preventing and combating the spread of diseases and pests that harm plants and plant products. One way to accomplish that is to utilise a phytosanitary certificate.[10]

All living plants and most types of living plant parts and a number of other plant products must come with a phytosanitary certificate when they are imported from a country outside the EU.

A phytosanitary certificate is a document issued by the official plant health authority. It certifies that the plant health import requirements of the recipient country have been met. A phytosanitary certificate does not contain information about which pesticides and growth inhibitors have been used during the flower production or information about production conditions or the working environment.

[10] https://lbst.dk/virksomheder/import-og-eksport/import-ind-i-eu-plantesundhed-handelsnormer-og-cites/importkontrol-plantesundhed/#c68812

Organic products imported from countries outside the EU/EEA (third countries) are comprised by special rules to ensure that they at least fulfil the standards of the current organic regulation of the EU.[11] New retail rules and regulations for organic control come into force on 1 January 2022, cf. the Regulation on organic production 2018/848.[12]

When trading within the EU, all plants for planting that are moved between companies (e.g., from the horticultural sector to distributor or from distributor to retail shop) must have a plant passport.[13,14] The plant passport requirement when selling plants within the EU also comprises plants that have been imported from a country outside the EU and that subsequently are marketed in the EU. ”Plants for planting” are plants that can be planted out, replanted or remain planted. Potted plants, cuttings, rolled turf, and aquatics are examples of ”plants for planting”. Only in certain cases, the plants must also have a plant passport that follows the plant all the way to the final consumer.

The plant passport shows that the plants or the plant products are officially controlled at the place of production, and it makes it possible to trace the plants back to the manufacturer. It may be essential to find the source of infection if a plant is infected. A plant passport must have a traceability code (letter, number or letter and number code) that identifies the trade unit and makes it possible to retrace the origin of the plants. The plant passport does not contain information about which pesticides and growth inhibitors were used during the flower production.

Whether or not a plant needs a plant passport depends on whether sale for commercial use, sale to the final consumer or sale via the internet is in question and for which harmful organisms the plant is host. Most plants only need a plant passport in connection with sale for commercial use, but some plants also need a passport in connection with sale to the final consumer. The reason might be that they are host plants for serious quarantine organisms or that they are going to be sold to countries/areas that are protected zones of a given harmful organism. In connection with internet trade, the need for a plant passport remains in force also during sale to the final consumer.

6.6 Certification schemes

A wide range of certification schemes exist in the flower industry, and they have been reported by Rikken (2010). One of the certification schemes is called Kenya Flower Council Silver (KFC)[15], and it is a trade association for flower manufacturers in Kenya. In the scheme KFC Silver standard, focus is on production, environment, and working conditions. On their homepage, various certification schemes[16] are compared.

GRASP (GLOBALG.A.P. Risk Assessment on Social Practice) mainly focuses on the health, safety, and the well-being of workers. Fairtrade standards make requirements to production and working conditions, including bans on a number of pesticides.

[11] https://lbst.dk/tvaergaaende/oekologi/import-af-oekologiske-produkter/import-fra-et-tredjeland/import-fra-godkendte-tredjelande-traces-nt/

[12] https://lbst.dk/tvaergaaende/oekologi/lovstof/kommende-eu-lovgivning-fra-2022/den-kommende-oekologiforordning-og-detailregler-der-er-blevet-vedtaget/

[13] https://lbst.dk/virksomheder/import-og-eksport/import-ind-i-eu-plantesundhed-handelsnormer-og-cites/importkontrol-plantesundhed/#c68669

[14] https://lbst.dk/virksomheder/gartneri/produktion-og-salg-i-eu/faq-plantepas/

[15] https://kenyaflowercouncil.org

[16] https://kenyaflowercouncil.org/index.php/our-story/our-standard

According to Jensen (2020) it is assessed that between 50% and 75% of the flowers that are imported to the EU have been certified, e.g., MPS-ABC. Control analyses are not carried out for pesticide residues when importing to the EU to verify that the standards are met. It is assumed that the third-party players, who check the certified companies, are reliable. Jensen (2020) carried out a questionnaire study, and 23% of the questioned florists said that they with certainty purchase certified flowers, whereas 58% did not know, and 19% decline certified flowers.
In interviews carried out in connection with this project, the MPS scheme (Mileu Programma Siertetlt) was referred to most often. Mainly the MPS certification scheme was used by the interviewed, and therefore the principles of that scheme are described in the following chapter.

6.6.1 MPS certification schemes

The Mileu Programma Siertetlt (MPS)[17] is an international, Dutch certification body for the horticultural sector. Environment, quality, and social aspects are the main focus areas of MPS.

When certified at MPS, the participant is under an obligation to register a number of parameters, e.g., energy consumption, fertiliser, and chemicals (including pesticides) in greenhouses and various categories of waste. It is mandatory to draw up an IPM plan (Integrated Pest Management or Integrated Crop Protection). The objective of an IPM is to establish a sustainable approach to plant protection. This means, that a grower uses as few chemical crop protection agents as possible, and only when there is no other option. A MPS blacklist of active substances[18] (Appendix 1.3) has been prepared, and it describes which active substances in pesticide products certified manufacturers must not use.

Every month, the participant is awarded points depending on whether consumption has decreased or increased compared to the limit values in question, and then a MPS-A+, A, B or C certificate is issued. A+ is the highest level (110 points). When the parameters have been registered for a given period, the registration is controlled through audit by an independent certification body who issues the certificate. A new assessment takes place every third month. A horticultural market needs more than 70 points to become qualified for a MPS-A certificate.

With a MPS Socially Qualified (MPS-SQ)[19] certificate you demonstrate that your products are produced under good working conditions. Production is assessed in relation to health, safety and employment conditions and is based on human rights, the behavioural rules for local, representative organisations and agreements from the International Labour Organization (ILO).

A MPS Good Agricultural Practice (MPS-GAP)[20] certificate is awarded from the assessment of the production in relation to environment, production conditions, and working environment. It might also comprise an assessment of quality, sustainability, and traceability. A MPS-GAP certificate is part of the MPS-Florimark Trade[21], which is the leading quality label for a sustainable production[22].

To obtain MPS-SQ or MPS-GAP it is necessary to be MPS-ABC certified.
MPS-ABC meets the requirements of The Floriculture Sustainability Initiative (FSI)[23] and Royal FloraHolland, which is the largest digital flower marketplace in the Netherlands.

[17] https://my-mps.com/diensten/mps-abc/?lang=en

[18] https://my-mps.com/wp-content/uploads/2020/01/EN-MPS-Black-List-active-substances-2.pdf

[19] https://my-mps.com/faq/wat-is-mps-socially-qualified-mps-sq/?lang=en

[20] https://my-mps.com/diensten/mps-gap/?lang=en

[21] https://my-mps.com/wp-content/uploads/2020/01/EN-Certification-scheme-MPS-Florimark-Trade-v3-excl-wijzigingen-gemarkeerd-1.pdf

[22] https://queenflowers.dk/miljoe,-mps

[23] https://www.fsi2025.com

7. The Danish market

7.1 Market investigation

Questionnaires sent to manufacturers, importers and distributors of flower products focused on learning about purchase and consumer patterns instead of tangible and exact data such as sales figures. It was expected that more information would be obtained from distributors about products on the Danish market. Just as in the case of Statistics Denmark, the questionnaires included products that are sold to professionals and consumers, as well as products intended for re-import.

In general, the players were asked questions about:

- Product type and country of origin (countries outside the EU)
- Use of certification schemes
- Knowledge about semi-manufactured goods
- Waste handling

7.1.1 Questionnaire study

The objective of the questionnaire study was to obtain information about flower products on the Danish market. The method was suitable for seeking information from flower shops, importers, nurseries, and horticultural markets that are very widespread in Denmark. The questionnaires used in connection with the investigation are attached in Appendix 3.2 and they were sent to the e-mail addresses of the companies. They were found by means of general internet searches. Questionnaires were sent to a total of 224 companies, and 98 replies were received. The replies are distributed on two importers, 57 flower distributors, and 39 horticultural markets/nurseries.

7.1.2 Interviewing the retail trade

Interviews with selected parties in the retail trade were carried out with a point of reference in questions included in the questionnaire study (Appendix 3.2). In addition, the companies could contribute with other information relevant to the project.

7.2 Results of the market investigation

Due to the wish to uncover and map the type of products that are sold, the questionnaire study asked which products are sold, and it was possible to choose specific product types and to give other answers. If only the distribution between the possible answers is observed, then the main products that are sold are cut flowers and potted plants, which corresponds to the two main categories that are imported (chapter 6.3.1). If other products are mentioned, then mainly products belonging to the product category living plants are in question. In addition, dried plants are mentioned.

The questionnaire forwarded to flower shops, nurseries, horticultural markets, and importers included questions about who the customers are, and the possible answers were consumers, supermarkets, flower shops and export, and it was possible to mention others. Products are mainly sold to the consumers. However, a substantial part is also sold to trade and industry such as companies, hotels, cemeteries, and landscape gardeners. A minor percentage of 11% stated that the products are exported and do not reach the Danish consumer. However, it cannot be ruled out that a higher percentage of products are exported.

7.2.1 Country of origin

One question was where the products are purchased and the answer was that products are purchased from wholesale businesses, auction houses or manufacturers. Only a minor percentage (3%) state that they purchase goods directly from the manufacturer in countries outside the EU. In other cases, products are not purchased at all, as horticultural gardening markets make their own products. However, it was not once mentioned that cuttings are purchased for production. In interviews with the retail trade, it was

mentioned that trade does not take place directly with the manufacturers as other purchasers often are more competent.

The questionnaire study inquired about knowledge of several countries outside the EU (Appendix 3.2). The answers show that most knowledge is concentrated on Ecuador, Kenya, and South Africa. Added to that comes other countries on other continents. Others say that only Danish products are sold. A total of 38% of the respondents, state that they do not know which products come from countries outside the EU. Presumably that means that information about the country of origin does not reach the consumer. Substantially fewer know about the country of origin of semi-manufactured goods, i.e., 18% of the respondents. In interviews with the retail trade, it is mentioned that cut roses solely originate from African countries.

24% of the respondents, state that flower products from countries outside the EU are not sold, and 40% state that the share of products that originate from outside the EU amount to less than 40% of the flower products. 29% do not know the full extent.

Regarding semi-manufactured goods, 51% state that products rarely or never are made of semi-manufactured goods, and 30% state they do not know if the sold flower products are made of semi-manufactured goods.

7.2.2 Product quality

Many flower shops, importers, nurseries, and horticultural markets make demands on their suppliers, and they mainly request a MPS-ABC certificate. In addition, some distributors make further demands such as:

- MPS-ABC, MPS-SQ, MPS-GAP
- GRASP
- Fairtrade (FLO-CERT)
- Ecology

Interviews of the retail trade showed that when demanding a MPS (see chapter 6.6.1), the retail trade expects that the current legislation and requirements stated in MPS for use of pesticides are complied with when producing flower products. An analytical control is not carried out. In some cases, a retailer has personally visited the manufacturers to assess the production and working conditions. None of the interviewees knew anything about which pesticides are used or to which degree they might be used. However, it was described that through the years it has been observed that the manufacturers try to reduce the use of pesticides and growth inhibitors.

7.2.3 Ecology

The questionnaire study inquired about how great a share of the flower products that are sold are organic. The respondents answered none (26%), less than 20% (46%) or 20-40% (6%). 20% state that they do not know how large an amount of the products is organic.

7.2.4 Waste handling

When asked to which degree special waste handling of flower products is required due to the risk of a content of pesticide residues, the respondents in general state that special waste handling is not necessary. Danish greenhouse nurseries may have used pesticides that must not be released to the environment, and therefore there are special requirements to composting to avoid leaking of pesticides. However, 4% state that special waste handling is required. The interviewees comprise horticultural markets, nurseries, importers, and flower shops.

The report by Jensen (2020) notes that waste from cut flowers often ends as compost as a total of 70% of the waste from the flower distributors either is sorted as bio waste or garden waste and a lot of that goes to compost.

8. Conclusion

The authorisation to market pesticide products takes place nationally, and therefore, it can differ from country to country which pesticide products are approved for use in the production of flowers. That means, that pesticides that are not permitted in the EU might have been used in countries outside the EU. In some cases, only half of the pesticides that are approved in a country outside the EU are allowed in the EU. Other EU countries might also use pesticides that are not approved for use in greenhouses in Denmark.

In connection with import of flower products to Denmark and other EU countries, the plant health regulation (2016/2031/EC) applies. The plant health provisions shall ensure that undesirable plants organisms are not imported with the plants to the recipient country. It cannot be excluded that these import demands could be an incentive for manufacturers of flowers to carry out intensive spraying with pesticides before export to the EU. There might be cases, where the use of a specific pesticide is demanded in an export country, e.g., against local plant diseases and pests, although the pesticide is not permitted in the EU.

Flowers and other plants can contain residue concentrations of pesticides used for production. A number of different pesticides might have been used, and therefore the plants can contain residue concentrations from many different pesticides. Through analyses, more than 30 different pesticides were found in the same plant material. Literature shows that special focus has been on the analysis of cut flowers that often are imported to the EU from third countries. The residue concentrations of pesticides that can be found in a flower product depends on the type of product and the country of origin.

There are no limit values to the content of pesticides in flower products in European legislation. On the other hand, limit values determined by the individual retail trade exist, but they are not shared by the entire retail trade. That is for instance the case for Germany, the Netherlands, and Belgium.

In 2020, 160.000 tons of flower products were imported to Denmark, and mainly the product categories cut flowers and living plants such as potted plants were imported. A minor part comprises cuttings that after breeding might end as export goods. Other products can via intermediaries end up in companies or among professional users but not necessarily among consumers. Added to that comes that import figures do not include the country of origin and a large part of imports take place via other EU countries. The Netherlands account for the largest import to the EU and also has the largest commercial trade with EU countries. Therefore, it is difficult to estimate the amount of flower products that are imported from countries outside the EU to the Danish market and that will be available to Danish consumers. However, it is often mentioned that especially cut flowers are produced outside the EU; African countries are for instance major manufacturers of cut roses.

Questionnaires sent to manufacturers, importers, and distributors of flower products, showed that a total of 38% of the respondents stated that they have no knowledge of which products come from countries outside the EU. Substantially fewer have knowledge of the country of origin of semi-manufactured goods, namely 18% of the respondents. Many Danish flower shops, the retail trade, importers, nurseries, and horticultural markets make demands on their suppliers, and they especially request a MPS-ABC certificate.

The retail trade in certain EU countries supervises the flower products that are sold. That is not the case in Denmark. By cooperating with the retail trade in these countries, it might be possible to obtain updated data on pesticide residues in flower products that are imported from countries outside the EU.

To obtain actual knowledge about pesticide residues in flower products on the Danish market it will be necessary to collect products for analysis. As the residue concentration is expected to be highest for pesticides used to ensure plant health immediately before export to the EU, it is suggested to focus on these pesticides, possibly supplemented with a general screening, as there are suitable methods for analysing a wide range of pesticides in connection with control of plant-based foodstuff.

If products are drawn from the Danish market for analysis of content of pesticides it is suggested that flower products from countries outside the EU should be chosen, as well as products from other countries within the EU for comparison. That is because cuttings are imported to the EU from countries outside the EU for breeding and further sale within the EU. If focus is sought for on what constitutes the greatest risk to the consumer, then it is suggested that cut flowers should be analysed. They are expected to have the greatest exposure as they usually require cutting.

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Appendix 1. Pesticides approved in flower production

Appendix 1.1 Pesticides approved for flower production in Malaysia

List of Registered Active Ingredient for Crop Flower in Malaysia

No.	Tanaman *Crop*	Nama Saintifik Perosak *Pest Scientific Name*	Nama Biasa Perosak *Pest Common Name in*	Perawis Aktif *Active Ingredient*
1	AZALEAS	*Polyphagotarsonemus latus*	hama	Chlorfenapyr
2	AZALEAS	*Tetranychus urticae*	hama merah	Chlorfenapyr
3	BEGONIA	*Limax flavus*	lintah bulan	Metaldehyde
4	BEGONIA	*Achatina fulica*	siput	Metaldehyde
5	CARNATION	*Achatina* sp.	siput	Metaldehyde
6	CARNATION	*Deroceras laeva*	lintah bulan	Metaldehyde
7	CARNATION	*Limax maximus*	lintah bulan	Metaldehyde
8	CARNATION	*Tetranychus urticae*	hama merah	lambda-cyhalothrin
9	CHRYSANTHEMUM	*Achatina fulica*	siput	metaldehyde
10	CHRYSANTHEMUM	*Alternaria alternata*	bintik perang	mancozeb
11	CHRYSANTHEMUM	*Alternaria alternata*	bintik perang	chlorothalonil
12	CHRYSANTHEMUM	*Alternaria alternata*	bintik perang	iprodione
13	CHRYSANTHEMUM	*Aphis gossypii*	kutu daun	imidacloprid
14	CHRYSANTHEMUM	*Aphis gossypii*	kutu daun	phosmet
15	CHRYSANTHEMUM	*Aphis gossypii*	kutu daun	lambda-cyhalothrin
16	CHRYSANTHEMUM	*Aponychus corpuzae*	hama	abamectin
17	CHRYSANTHEMUM	*Botrytis cinerea*	hawar Botrytis	chlorothalonil
18	CHRYSANTHEMUM	*Botrytis cinerea*	hawar Botrytis	iprodione
19	CHRYSANTHEMUM	*Botrytis cinerea*	reput lapuk kelabu	fluopyram + tebuconazole
20	CHRYSANTHEMUM	*Cercospora bidentis*	bintik daun	mancozeb
21	CHRYSANTHEMUM	*Cercospora canescens*	bintik daun	mancozeb
22	CHRYSANTHEMUM	*Cercospora capsici*	bintik daun	carbendazim
23	CHRYSANTHEMUM	*Cercospora capsici*	bintik daun	mancozeb
24	CHRYSANTHEMUM	*Cercospora chrysanthemi*	bintik daun	propineb
25	CHRYSANTHEMUM	*Cercospora chrysanthemi*	bintik daun	carbendazim
26	CHRYSANTHEMUM	*Cercospora chrysanthemi*	bintik daun	mancozeb
27	CHRYSANTHEMUM	*Cercospora dendrobii*	bintik daun	mancozeb
28	CHRYSANTHEMUM	*Cercospora grachidicola*	kelapuk berdebu	carbendazim
29	CHRYSANTHEMUM	*Cercospora* sp.	bintik daun	carbendazim
30	CHRYSANTHEMUM	*Chromatomyia horticola*	ulat pelombong daun	cypermethrin
31	CHRYSANTHEMUM	*Chromatomyia horticola*	ulat pelombong daun	abamectin
32	CHRYSANTHEMUM	*Chromatomyia horticola*	ulat pelombong daun	dimethoate
33	CHRYSANTHEMUM	*Chromatomyia horticola*	ulat pelombong daun	thiocyclam hydrogen oxalate
34	CHRYSANTHEMUM	*Chromatomyia horticola*	ulat pelombong daun	carbosulfan
35	CHRYSANTHEMUM	*Chromatomyia syrgenesiae*	ulat pelombong daun	cyromazine
36	CHRYSANTHEMUM	*Colletotrichum capsici*	antraknos/bintik daun	carbendazim
37	CHRYSANTHEMUM	*Colletotrichum*	antraknos	mancozeb
38	CHRYSANTHEMUM	*Cyperus iria*	rusiga anak emas	pendimethalin
39	CHRYSANTHEMUM	*Deroceras laeva*	lintah bulan	metaldehyde
40	CHRYSANTHEMUM	*Erysiphe cichoracearum*	kulapuk berdebu	carbendazim
41	CHRYSANTHEMUM	*Eutetranychus orientalis*	hama	abamectin
42	CHRYSANTHEMUM	*Frankliniella occidentalis*	kutu trip	deltamethrin
43	CHRYSANTHEMUM	*Frankliniella occidentalis*	kutu trip	azadirachtin
44	CHRYSANTHEMUM	*Frankliniella occidentalis*	kutu trip	abamectin
45	CHRYSANTHEMUM	*Frankliniella occidentalis*	kutu trip	imidacloprid
46	CHRYSANTHEMUM	*Fusarium oxysporum*	layu Fusarium	thiophanate-methyl
47	CHRYSANTHEMUM	*Fusarium oxysporum*	layu Fusarium	benomyl
48	CHRYSANTHEMUM	*Fusarium oxysporum*	layu Fusarium	chlorothalonil

No.	Tanaman	Nama Saintifik Perosak	Nama Biasa Perosak	Perawis Aktif
	Crop	*Pest Scientific Name*	*Pest Common Name in*	*Active Ingredient*
49	CHRYSANTHEMUM	*Fusarium oxysporum*	layu Fusarium	dazomet
50	CHRYSANTHEMUM	*Fusarium oxysporum*	layu Fusarium	carbendazim
51	CHRYSANTHEMUM	*Fusarium oxysporum*	layu Fusarium	difenoconazole
52	CHRYSANTHEMUM	*Limax maximus*	lintah bulan	metaldehyde
53	CHRYSANTHEMUM	*Liriomyza huidobrensis*	ulat pelombong daun	deltamethrin
54	CHRYSANTHEMUM	*Liriomyza huidobrensis*	ulat pelombong daun	cyromazine
55	CHRYSANTHEMUM	*Liriomyza huidobrensis*	ulat pelombong daun	abamectin
56	CHRYSANTHEMUM	*Liriomyza sativae*	ulat pelombong daun	deltamethrin
57	CHRYSANTHEMUM	*Liriomyza sativae*	ulat pelombong daun	cyromazine
58	CHRYSANTHEMUM	*Liriomyza strigata*	ulat pelombong daun	abamectin
59	CHRYSANTHEMUM	*Liriomyza trifolii*	ulat pelombong daun	deltamethrin
60	CHRYSANTHEMUM	*Liriomyza trifolii*	ulat pelombong daun	cypermethrin
61	CHRYSANTHEMUM	*Liriomyza trifolii*	ulat pelombong daun	abamectin
62	CHRYSANTHEMUM	*Liriomyza trifolii*	ulat pelombong daun	cyromazine
63	CHRYSANTHEMUM	*Liriomyza trifolii*	ulat pelombong daun	phosmet
64	CHRYSANTHEMUM	*Liriomyza trifolii*	ulat pelombong daun	imidacloprid
65	CHRYSANTHEMUM	*Liriomyza* sp.	ulat pelombong daun	deltamethrin
66	CHRYSANTHEMUM	*Meliola citricola*	kulapuk hitam	mancozeb
67	CHRYSANTHEMUM	*Myzus persicae*	kutu daun	thiamethoxam + lambda-
68	CHRYSANTHEMUM	*Phyllotreta striolata*	kabuh lenting	clothianidin
69	CHRYSANTHEMUM	*Phytomyza atricornis*	ulat pelombong daun	imidacloprid
70	CHRYSANTHEMUM	*Phytomyza syngenesia*	pelombong daun	imidacloprid
71	CHRYSANTHEMUM	*Polyphagotarsonemus latus*	hama	amitraz
72	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	propiconazole
73	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	carbendazim + epoxiconazole
74	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	azoxystrobin
75	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	flutriafol
76	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	metominostrobin
77	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	flutolanil
78	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	trifloxystrobin + tebuconazole
79	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	myclobutanil
80	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	mancozeb
81	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	kresoxim-methyl
82	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	dimethomorph + mancozeb
83	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	tebuconazole
84	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	triforine
85	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	cymoxanil + mancozeb
86	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	hexaconazole
87	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	myclobutanil
88	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	kresoxim-methyl
89	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	cymoxanil + famoxadone
90	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	epoxiconazole + carbendazim
91	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	chlorothalonil + azoxystrobin
92	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	tebuconazole + trifloxystrobin
93	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	azoxystrobin + difenoconazole
94	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	tetraconazole
95	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	trifloxystrobin
96	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	difenoconazole
97	CHRYSANTHEMUM	*Pucciana horiana*	karat putih	azoxystrobin + tebuconazole
98	CHRYSANTHEMUM	*Puccinia chrysanthemi*	karat	zineb
99	CHRYSANTHEMUM	*Puccinia chrysanthemi*	karat	azoxystrobin
100	CHRYSANTHEMUM	*Puccinia chrysanthemi*	karat	triadimefon
101	CHRYSANTHEMUM	*Pythium* sp.	reput akar	propamocarb hydrochloride
102	CHRYSANTHEMUM	*Rhizoctonia solani*	reput akar	mancozeb
103	CHRYSANTHEMUM	*Rhizoctonia solani*	reput batang	mancozeb
104	CHRYSANTHEMUM	*Rhizoctonia solani*	reput pangkal/kolar	mancozeb
105	CHRYSANTHEMUM	*Sclerotium rolfsii*	hawar anak benih	mancozeb
106	CHRYSANTHEMUM	*Sclerotium rolfsii*	layu pokok	mancozeb
107	CHRYSANTHEMUM	*Sclerotium rolfsii*	layu Sclerotium	mancozeb
108	CHRYSANTHEMUM	*Sclerotium rolfsii*	penyakit layu	mancozeb
109	CHRYSANTHEMUM	*Sclerotium rolfsii*	reput akar	mancozeb
110	CHRYSANTHEMUM	*Sclerotium rolfsii*	reput batang	mancozeb
111	CHRYSANTHEMUM	*Septoria chrysanthemella*	bintik daun	chlorothalonil
112	CHRYSANTHEMUM	*Septoria chrysanthemella*	bintik daun	zineb

No.	Tanaman	Nama Saintifik Perosak	Nama Biasa Perosak	Perawis Aktif
	Crop	*Pest Scientific Name*	*Pest Common Name in*	*Active Ingredient*
113	CHRYSANTHEMUM	*Septoria chrysanthemella*	bintik daun	carbendazim
114	CHRYSANTHEMUM	*Sphaerotheca pannosa*	kulapuk berdebu	hexaconazole
115	CHRYSANTHEMUM	*Spodoptera litura*	ulat ratus	imidacloprid
116	CHRYSANTHEMUM	*Spodoptera litura*	ulat ratus	thiamethoxam + lambda-
117	CHRYSANTHEMUM	*Spodoptera litura*	ulat ratus	fipronil
118	CHRYSANTHEMUM	*Spodoptera litura*	ulat ratus	lambda-cyhalothrin
119	CHRYSANTHEMUM	*Spodoptera litura*	ulat ratus	phosmet
120	CHRYSANTHEMUM	*Spodoptera litura*	ulat ratus	diflubenzuron
121	CHRYSANTHEMUM	*Tetranychus urticae*	hama merah	chlorfenapyr
122	CHRYSANTHEMUM	*Tetranychus urticae*	hama merah	fenpyroximate
123	CHRYSANTHEMUM	*Tetranychus urticae*	hama merah	amitraz
124	CHRYSANTHEMUM	*Tetranychus urticae*	hama merah	lambda-cyhalothrin
125	CHRYSANTHEMUM	*Tetranychus urticae*	hama merah	abamectin
126	CHRYSANTHEMUM	*Tetranychus urticae*	hama merah	spiromesifen + abamectin
127	CHRYSANTHEMUM	*Tetranychus urticae*	hama merah	spirodiclofen
128	CHRYSANTHEMUM	*Tetranychus urticae*	hama merah	chlorfenapyr
129	CHRYSANTHEMUM	*Tetranychus urticae*	hama merah	hexythiazox
130	CHRYSANTHEMUM	*Tetranychus* sp.	hama merah	amitraz
131	CHRYSANTHEMUM	*Thrips palmi*	kutu trip	imidacloprid
132	CHRYSANTHEMUM	*Thrips palmi*	kutu trip	abamectin
133	CHRYSANTHEMUM	*Thrips palmi*	kutu trip	lambda-cyhalothrin
134	CHRYSANTHEMUM	*Thrips palmi*	kutu trip	chlorpenapyr
135	CHRYSANTHEMUM	*Thrips palmi*	kutu trip	phosmet
136	CHRYSANTHEMUM	*Thrips palmi*	kutu trip	deltamethrin
137	CHRYSANTHEMUM	*Thrips* sp.	kutu trip	abamectin
138	CHRYSANTHEMUM	*Trialeurodes vaporariorum*	lalat putih	clothianidin
139	COLEUS	*Planococcus citri*	koya	buprofezin
140	FLOWER	*Tetranychus urticae*	hama merah	abamectin
141	GERBERA	*Erysiphe cichoracearum*	kulapuk berdebu	mancozeb
142	GERBERA	*Frankliniella occidentalis*	kutu trip	carbosulfan
143	GERBERA	*Liriomyza trifolii*	ulat pelombong daun	cyromazine
144	GERANIUM	*Puccinia helianthi*	karat	myclobutanil
145	GERANIUM	*Puccinia hemerocallidis*	karat	myclobutanil
146	GERANIUM	*Puccinia pelargonii-zonalis*	karat	myclobutanil
147	HIBISCUS	*Aphis rosae*	kutu daun	malathion
148	HIBISCUS	*Aspidiotus orientalis*	teritip	white oil
149	HIBISCUS	*Coccus mangifera*	teritip	white oil
150	HIBISCUS	*Myzus persicae*	kutu daun	abamectin
151	HIBISCUS	*Planococcus citri*	koya	white oil
152	HIBISCUS	*Thrips palmi*	kutu trip	malathion
153	IXORA	*Cercoseptoria ixoriana*	bintik daun	propineb
154	JASMINE	*Aleurodicus dispersus*	lalat putih	buprofezin
155	JASMINE	*Bemisia tabaci*	lalat putih	buprofezin
156	JASMINE	*Bemisia tabaci*	lalat putih	diafenthiuron
157	JASMINE	*Bemisia tabaci*	lalat putih	pyriproxyfen
158	JASMINE	*Bemisia tabaci*	lalat putih	buprofezin + esfenvalerate
159	JASMINE	*Bemisia tabaci*	lalat putih	diafenthiuron
160	JASMINE	*Bemisia tabaci*	lalat putih	pyriproxyfen
161	JASMINE	*Helicoverpa armigera*	ulat kuntum	buprofezin + esfenvalerate
162	JASMINE	*Thrips palmi*	kutu trip	lambda-cyhalothrin
163	LILY	*Puccinia helianthi*	karat	myclobutanil
164	LILY	*Puccinia hemerocallidis*	karat	myclobutanil
165	LILY	*Puccinia pelargonii-zonalis*	karat	myclobutanil
166	MARIGOLDS	*Polyphagotarsonemus latus*	hama	chlorfenapyr
167	MARIGOLDS	*Tetranychus urticae*	hama merah	chlorfenapyr
168	ORCHID	*Achatina fulica*	siput	metaldehyde
169	ORCHID	*Alternaria alternata*	bintik perang	mancozeb
170	ORCHID	*Aonidiella orientalis*	teritip	white oil
171	ORCHID	*Aphis gossypii*	kutu daun	malathion
172	ORCHID	*Aphis gossypii*	kutu daun	dimethoate
173	ORCHID	*Aspidiotus orientalis*	teritip	dimethoate
174	ORCHID	*Athelia rolfsii*	reput akar	mancozeb
175	ORCHID	*Botrytis cinerea*	hawar Botrytis	captan
176	ORCHID	*Botrytis cinerea*	reput lapuk kelabu	captan

No.	Tanaman	Nama Saintifik Perosak	Nama Biasa Perosak	Perawis Aktif
	Crop	*Pest Scientific Name*	*Pest Common Name in*	*Active Ingredient*
177	ORCHID	*Brevipalpus califonicus*	hama	abamectin
178	ORCHID	*Cerataphis orchidearum*	kutu daun	dimethoate
179	ORCHID	*Cercospora dendrobii*	bintik daun	thiram
180	ORCHID	*Cercospora dendrobii*	bintik daun	thiophanate-methyl
181	ORCHID	*Cercospora dendrobii*	bintik daun	thiophanate-methyl
182	ORCHID	*Cercospora* sp.	bintik daun	benomyl
183	ORCHID	*Coccus hesperidum*	teritip	dimethoate
184	ORCHID	*Coccus mangifera*	teritip	white oil
185	ORCHID	*Coccus viridis*	teritip	white oil
186	ORCHID	*Colletotrichum capsici*	antraknos/bintik daun	mancozeb
187	ORCHID	*Colletotrichum*	antraknos	mancozeb
188	ORCHID	*Colletotrichum*	antraknos	zineb
189	ORCHID	*Colletotrichum*	antraknos	propineb
190	ORCHID	*Colletotrichum*	antraknos	benomyl
191	ORCHID	*Colletotrichum*	antraknos	carbendazim
192	ORCHID	*Colletotrichum* sp.	antraknos	benomyl
193	ORCHID	*Colletotrichum* sp.	bintik daun	thiram
194	ORCHID	*Curvularia eragrostidis*	bintik karat	mancozeb
195	ORCHID	*Curvularia lunata*	bintik daun & bunga	propineb
196	ORCHID	*Deroceras laeva*	lintah bulan	metaldehyde
197	ORCHID	*Frankliniella occidentalis*	kutu trip	deltamethrin
198	ORCHID	*Fusarium moniliforme*	layu Fusarium	thiram
199	ORCHID	*Limax flavus*	lintah bulan	metaldehyde
200	ORCHID	*Limax maximus*	lintah bulan	metaldehyde
201	ORCHID	*Liriomyza sativae*	ulat pelombong daun	cyromazine
202	ORCHID	*Liriomyza sativae*	ulat pelombong daun	deltamethrin
203	ORCHID	*Phyllostica capitalensis*	bintik daun	mancozeb
204	ORCHID	*Phytophthora palmivora*	reput hitam	thiram
205	ORCHID	*Phytophthora palmivora*	reput hitam	benomyl
206	ORCHID	*Phytophthora palmivora*	reput lembut	thiram
207	ORCHID	*Phytophthora palmivora*	reput pangkal	metalaxyl
208	ORCHID	*Phytophthora palmivora*	reput pangkal	metalaxyl
209	ORCHID	*Phytophthora* sp.	reput akar	thiram
210	ORCHID	*Planococcus citri*	koya	malathion
211	ORCHID	*Polyphagotarsonemus latus*	hama	amitraz
212	ORCHID	*Pucciana horiana*	karat putih	tebuconazole
213	ORCHID	*Rhizoclonium*	alga	glufosinate-ammonium
214	ORCHID	*Rhizoctonia solani*	reput akar	mancozeb
215	ORCHID	*Rhizoctonia solani*	reput pangkal/kolar	mancozeb
216	ORCHID	*Scirtothrips dorsalis*	kutu trip	dimethoate
217	ORCHID	*Sclerotium rolfsii*	reput akar	mancozeb
218	ORCHID	*Sclerotium rolfsii*	reput akar	mancozeb
219	ORCHID	*Sclerotium rolfsii*	reput pangkal	tolclofos-methyl
220	ORCHID	*Tetranychus urticae*	hama merah	malathion
221	ORCHID	*Tetranychus* sp.	hama merah	amitraz
222	ORCHID	*Thrips palmi*	kutu trip	malathion
223	ORCHID	*Thrips palmi*	kutu trip	dimethoate
224	ORCHID	*Uredo behnickiana*	karat	thiram
225	POINSETTIA	*Bemisia tabaci*	lalat putih	pyridaben
226	POINSETTIA	*Bemisia tabaci*	lalat putih	pyriproxyfen
227	POINSETTIA	*Sphaceloma poinsettiae*	keruping	benomyl
228	POINSETTIA	*Sphaceloma poinsettiae*	keruping	tribasic copper sulfate
229	ROSE	*Achatina fulica*	siput	metaldehyde
230	ROSE	*Alternaria alternata*	bintik perang	mancozeb
231	ROSE	*Alternaria alternata*	bintik perang	iprodione
232	ROSE	*Alternaria solani*	hawar Alternaria	mancozeb
233	ROSE	*Aonidiella orientalis*	teritip	white oil
234	ROSE	*Aphis gossypii*	kutu daun	dimethoate
235	ROSE	*Aphis gossypii*	kutu daun	malathion
236	ROSE	*Aphis gossypii*	kutu daun	carbaryl
237	ROSE	*Aphis gossypii*	kutu daun	cypermethrin
238	ROSE	*Aponychus corpuzae*	hama	abamectin
239	ROSE	*Aspidiotus orientalis*	teritip	white oil
240	ROSE	*Botrytis cinerea*	hawar Botrytis	thiram
241	ROSE	*Botrytis cinerea*	hawar Botrytis	iprodione

No.	Tanaman	Nama Saintifik Perosak	Nama Biasa Perosak	Perawis Aktif
	Crop	*Pest Scientific Name*	*Pest Common Name in*	*Active Ingredient*
242	ROSE	*Botrytis cinerea*	reput lapuk kelabu	chlorothalonil
243	ROSE	*Cercospora citrullina*	bintik daun	mancozeb
244	ROSE	*Cercospora dendrobii*	bintik daun	mancozeb
245	ROSE	*Cercospora rosicola*	bintik daun	mancozeb
246	ROSE	*Cercospora rosicola*	bintik daun	copper hydroxide
247	ROSE	*Cercospora rosicola*	bintik daun	copper oxychloride
248	ROSE	*Cercospora rosicola*	bintik daun	thiophanate-methyl
249	ROSE	*Cercospora rosicola*	bintik daun	carbendazim
250	ROSE	*Coccus mangifera*	teritip	white oil
251	ROSE	*Coccus viridis*	teritip	white oil
252	ROSE	*Colletotrichum capsici*	antraknos/bintik daun	mancozeb
253	ROSE	*Colletotrichum*	antraknos	mancozeb
254	ROSE	*Colletotrichum*	bintik daun	thiophanate-methyl
255	ROSE	*Colletotrichum higginsianum*	antraknos	mancozeb
256	ROSE	*Diplocarpon rosae*	bintik hitam	chlorothalonil
257	ROSE	*Diplocarpon rosae*	bintik hitam	mancozeb
258	ROSE	*Diplocarpon rosae*	bintik hitam	azoxystrobin
259	ROSE	*Diplocarpon rosae*	bintik hitam	kresoxim-methyl
260	ROSE	*Diplocarpon rosae*	bintik hitam	thiram
261	ROSE	*Diplocarpon rosae*	bintik hitam	myclobutanil
262	ROSE	*Diplocarpon rosae*	bintik hitam	copper hydroxide
263	ROSE	*Diplocarpon rosae*	bintik hitam	hexaconazole
264	ROSE	*Diplocarpon rosae*	bintik hitam	metiram
265	ROSE	*Erysiphe cichoracearum*	kulapuk berdebu	triforine
266	ROSE	*Eutetranychus orientalis*	hama	abamectin
267	ROSE	*Frankliniella occidentalis*	kutu trip	lambda-cyhalothrin
268	ROSE	*Frankliniella occidentalis*	kutu trip	deltamethrin
269	ROSE	*Limax maximus*	lintah bulan	metaldehyde
270	ROSE	*Lipaphis erysimi*	kutu daun	cypermethrin
271	ROSE	*Liriomyza sativae*	ulat pelombong daun	cyromazine
272	ROSE	*Liriomyza trifolii*	ulat pelombong daun	deltamethrin
273	ROSE	*Macrosiphum rosae*	kutu daun/aphids	imidacloprid
274	ROSE	*Passalora rosicola*	bintik daun	mancozeb
275	ROSE	*Peronospora sparsa*	kulapuk downy	propamocarb hydrochloride
276	ROSE	*Phragmidium mucronatum*	karat	zineb
277	ROSE	*Phragmidium tubercunatum*	karat	triforine
278	ROSE	*Phytophthora infestans*	hawar Phytophthora	cymoxanil + zoxamide
279	ROSE	*Phytophthora infestans*	hawar Phytophthora	fipronil
280	ROSE	*Planococcus citri*	koya	malathion
281	ROSE	*Polyphagotarsonemus latus*	hama	amitraz
282	ROSE	*Pseudoperonospora*	kulapuk downy	benalaxyl-M + chlorothalonil
283	ROSE	*Pucciana horiana*	karat putih	hexaconazole
284	ROSE	*Pucciana horiana*	karat putih	tebuconazole
285	ROSE	*Rhizoctonia solani*	reput akar	mancozeb
286	ROSE	*Scirtothrips dorsalis*	kutu trip	dimethoate
287	ROSE	*Sclerotium rolfsii*	hawar anak benih	mancozeb
288	ROSE	*Sclerotium rolfsii*	penyakit layu	mancozeb
289	ROSE	*Sclerotium rolfsii*	reput akar	mancozeb
290	ROSE	*Sphaerotheca pannosa*	kulapuk berdebu	hexaconazole
291	ROSE	*Sphaerotheca pannosa*	kulapuk berdebu	chlorothalonil
292	ROSE	*Sphaerotheca pannosa*	kulapuk berdebu	tridemorph
293	ROSE	*Sphaerotheca pannosa*	kulapuk berdebu	captan
294	ROSE	*Sphaerotheca pannosa*	kulapuk berdebu	copper hydroxide
295	ROSE	*Sphaerotheca pannosa*	kulapuk berdebu	tetraconazole
296	ROSE	*Sphaerotheca pannosa*	kulapuk berdebu	sulfur
297	ROSE	*Tetranychus truncatus*	hama merah	abamectin
298	ROSE	*Tetranychus urticae*	hama merah	hexythiazox
299	ROSE	*Tetranychus urticae*	hama merah	amitraz
300	ROSE	*Tetranychus urticae*	hama merah	fenpyroximate
301	ROSE	*Tetranychus urticae*	hama merah	chlorfenapyr
302	ROSE	*Tetranychus urticae*	hama merah	abamectin
303	ROSE	*Tetranychus urticae*	hama merah	flufenoxuron
304	ROSE	*Tetranychus urticae*	hama merah	malathion
305	ROSE	*Tetranychus urticae*	hama merah	lambda-cyhalothrin
306	ROSE	*Tetranychus urticae*	hama merah	bifenthrin
307	ROSE	*Tetranychus urticae*	hama merah	pyridaben
308	ROSE	*Tetranychus urticae*	hama merah	amitraz
309	ROSE	*Tetranychus* sp.	hama merah	amitraz

No.	Tanaman	Nama Saintifik Perosak	Nama Biasa Perosak	Perawis Aktif
	Crop	*Pest Scientific Name*	*Pest Common Name in*	*Active Ingredient*
310	ROSE	*Thrips palmi*	kutu trip	malathion
311	SUN FLOWER	*Erysiphe cichoracearum*	kulapuk berdebu	hexaconazole
312	SUN FLOWER	*Puccinia helianthi*	karat	myclobutanil
313	SUN FLOWER	*Puccinia hemerocallidis*	karat	myclobutanil
314	SUN FLOWER	*Puccinia pelargonii-zonalis*	karat	myclobutanil

Appendix 1.2 Pesticides approved for the production of ornamentals in the Philippines

REGISTERED PESTICIDE ACTIVE INGREDIENTS FOR ORNAMENTALS		
ACTIVE INGREDIENT	**USE/S**	**Pets/weeds/diseases**
CAPTAN	FUNGICIDE	Black spots, phytophthora
CHLOROTHALONIL	FUNGICIDE	Black spot, powdery mildew, black rot
ELEMENTAL SULPHUR	FUNGICIDE	Downy mildew, powdery mildew
MANCOZEB	FUNGICIDE	Black spot, blight, Anthracnose
PROPINEB	FUNGICIDE	Black spot, rust
SULPHUR	FUNGICIDE	Downy mildew, powdery mildew
THIOPHANATE METHYL	FUNGICIDE	Powdery mildew, black spots
ABAMECTIN	INSECTICIDE	Mites
CARBARYL	INSECTICIDE	Aphids, scale insect, mealy bug, cutworm
DIAZINON	INSECTICIDE	Grubs, mites, thrips
FENITROTHION	INSECTICIDE	Aphids, scale insects, mealy bug, cutworm
MALATHION	INSECTICIDE	Aphids, cutworm, mealy bug, scale insect, spider mites

Appendix 1.3 MPS Black list

MPS-Black list active substances

This list is valid from period 08 2017

No agents which contains active substances included on the MPS-Black list may be in possesion, stored or used by the participating company.

CAS-nr	Active substance	Remarks
96-12-8	**1,2-dibromo-3-chloropropane / DBCP**	
106-93-4	**1,2-dibromoethane**	Also known as ethylene dibromide
107-06-2	**1,2-dichloroethane**	Also known as ethylene dichloride
93-76-5	**2,4,5-trichlorophenoxyacetic acid**	
15972-60-8	**alachlor**	
116-06-3	**aldicarb**	
309-00-2	**aldrin**	
86-50-0	**azinphos-methyl**	
	Bacillus thuringiensis var thuringiensis B-exotoxine	
17804-35-2	**benomyl**	
485-31-4	**binapacryl**	
63333-35-7	**bromethalin**	
592-01-8	**calcium cyanide**	
8001-35-2	**camphechlor**	
2425-06-1	**captafol**	
1563-66-2	**carbofuran**	
55285-14-8	**carbosulfan**	
57-74-9	**chlordane**	
143-50-0	**chlordecone**	
6164-98-3	**chlordimeform**	
54593-83-8	**chlorethoxyfos**	
24934-91-6	**chlormephos**	
510-15-6	**chlorobenzilate**	
3691-35-8	**chlorophacinone**	
50-29-3	**DDT**	
62-73-7	**dichlorvos**	
60-57-1	**dieldrin**	
88-85-7	**dinoseb**	
82-66-6	**diphacinone**	
298-04-4	**disulfoton**	
534-52-1	**DNOC**	
115-29-7	**endosulfan**	
72-20-8	**endrin**	
2104-64-5	**EPN**	
13194-48-4	**ethoprophos**	
75-21-8	**ethylene oxide**	
93-72-1	**fenoprop**	
640-19-7	**fluoroacetamide**	
608-73-1	**HCH**	Also known as BHC, 666, hexachlor(cyclohexane)
76-44-8	**heptachlor**	
118-74-1	**hexachlorobenzene**	Also known as HCB
58-89-9	**lindane**	Also known as γ-HCH
7487-94-7	**mercuric chloride**	
21908-53-2	**mercuric oxide**	
10265-92-6	**methamidophos**	
74-83-9	**methyl bromide**	
7786-34-7	**mevinphos**	
2385-85-5	**mirex**	
6923-22-4	**monocrotophos**	
1836-75-5	**nitrofen**	

EN MPS-Black list active substances v2 080817

Appendix 2. Import of flower products

Appendix 2.1 Outline of CN codes of flower products

TABLE 7. CN codes of flower products

CN	Text	Unit
0601	Bulbs, tubers, tuberous roots, corms, crowns, and rhizomes, in growth or in bloom; chicory plants and roots except for chicory roots belonging under item 1212	
0601 10	- Bulbs, tubers, tuberous roots, corms, crowns, and rhizomes, dormant	
0601 10 10	-- Dormant hyacinths	Number of items
0601 10 20	-- Dormant narcissi bulbs	Number of items
0601 10 30	-- Dormant tulip bulbs	Number of items
0601 10 40	-- Dormant gladioli bulbs	Number of items
0601 10 90	-- Other goods	Number of items
0601 20	- Bulbs, tubers, tuberous roots, corms, crowns, and rhizomes, in growth or in bloom	
0601 20 10	-- Chicory plants and roots	-
0601 20 30	-- Orchids, hyacinths, narcissi, and tulips	-
0601 20 90	-- Other goods	-
0602	Other living plants (including roots), cuttings and scions; mycelium	
0602 10	- Cuttings without roots and scions	
0602 10 10	--from grapevines	-
0602 10 90	-- In other cases	-
0602 20	- Trees and bushes, also grafted, of the type that carry edible fruits or nuts	
0602 20 10	--grapevines with roots, also inoculated	-
0602 20 20	--- with bare roots	Number of items
0602 20 30	---- citrus trees	Number of items
0602 20 80	---- Other goods	Number of items
0602 30 00	- Rhododendron and azalea, also grafted	Number of items
0602 40 00	- Rose plants, grafted	Number of items
0602 90	- Other goods	
0602 90 10	-- Mycelium	-
0602 90 20	-- Pineapple plants	-
0602 90 30	-- Vegetables and strawberry plants	-
0602 90 41	----- Forest trees	Number of items
0602 90 45	------ Cuttings with roots and young plants	Number of items
0602 90 46	------- with bare roots	Number of items

CN	Text	Unit
0602 90 47	-------- Conifers and evergreens	Number of items
0602 90 48	-------- Other goods	Number of items
0602 90 50	---- Other outdoor plants	-
0602 90 70	---- Cuttings with root and young plants, except for cactuses	Number of items
0602 90 91	----- Flower plants with buds or flowers, except for cactuses	Number of items
0602 90 99	----- Other goods	Number of items
0603	Cut flowers and flower buds of the type used for bouquets or ornamentally, fresh, dried, bleached, dyed, impregnated, or prepared in another way	
0603 11 00	-- Roses	Number of items
0603 12 00	-- Carnations	Number of items
0603 13 00	-- Orchids	Number of items
0603 14 00	-- Chrysanthemum	Number of items
0603 15 00	-- Lilies (Lilium-types)	Number of items
0603 19	-- Other goods	
0603 19 10	--- Gladiolus	Number of items
0603 19 20	--- Buttercups	Number of items
0603 19 70	--- Other goods	Number of items
0603 90 00	- In other cases	-
0604	Leaves, branches and other plant parts without flowers or flower buds, and grass, moss and lichen of the type used for bouquets or ornamentally, fresh, dried, bleached, dyed, impregnated, or prepared in another way	
0604 20	- Fresh	
0604 20 11	--- Reindeer moss	-
0604 20 19	--- Other goods	-
0604 20 20	-- Christmas trees	Number of items
0604 20 40	-- Needles from conifers	-
0604 20 90	-- Other goods	-
0604 90	- In other cases	

Appendix 2.2 Import of flower products to Denmark in 2020

Flower products with CN codes registered imported to Denmark in 2020. The products have been sorted in declining tonnage (TABLE 8).

TABLE 8. Flower products imported to Denmark in 2020

No.	CN code	Tonnage 2020 [kilo]
1	06029091 Indoor plants with buds or flowers (except cactuses)	35971783
2	06029099 Indoor plants, living (except cuttings and young plants as well as flower plants with buds or flowers)	25538453
3	06029050 Outdoor plants, living, including living roots (except bulbs, tubers, tuberous roots, corms, crowns, and rhizomes including chicory plants and roots, cuttings without roots and scions, rhododendron, and azalea, rose plants.	17623381
4	06029048 Trees and bushes, outdoor plants, with roots, except bare roots, cuttings, scions, young plants, conifers, evergreens and fruit, nut and forest trees.	12636111
5	06042020 Christmas trees, fresh	9957117
6	06039000 Cut flowers and flower buds of the type used for bouquets or ornamentally, dried, bleached, dyed, impregnated, or prepared in another way.	8479099
7	06031970 Cut flowers and buds, fresh, of the type that is used for bouquets or ornamentally, except for roses carnations, orchids, gladiolus, buttercups, chrysanthemum, or lilies.	7264743
8	06029070 Cuttings with roots from indoor plants, including young plants (except cactuses).	5755425
9	06029030 Vegetable plants and strawberry plants.	5741244
10	06029047 Conifers and evergreens and bushes, outdoor plants, with roots, except for bare roots, cuttings, scions, young plants and fruit, nut and forest plants.	4658222
11	06023000 Rhododendron and azalea, also grafted.	3522496
12	06049099 Leaves, branches and other plant parts, without flowers or flower buds, and grass, of the type used for bouquets or ornamentally, bleached, dyed, impregnated or prepared in another way (except only dried).	3054769
13	06031100 Cut roses and rose buds of the type used for bouquets or ornamentally, fresh.	2597974
14	06011090 Bulbs, tubers, tuberous roots, corms, crowns, and rhizomes, dormant or not in bloom (except edible bulbs, roots and tuberous roots, and hyacinth bulbs, narcissi bulbs, tulip bulbs, gladiolus bulbs and chicory plants and chicory roots).	2381335
15	06012030 Orchids, hyacinths, narcissi, and tulips in growth or in bloom.	2288176
16	06029046 Trees and bushes, with root/bare root, except cuttings, scions and young plants, and fruit, nut and forest trees.	1477762
17	06029041 Forest trees	1329920
18	06021090 Cuttings without roots and scions (except grapevines)	1204064
19	06042090 Leaves, branches and other plant parts, without flowers or flower buds, and grass of the type used for bouquets or ornamentally, fresh (except Christmas trees and branches from conifers).	1173324
20	06011030 Tulip bulbs, dormant or not in bloom	1087965

No.	CN code	Tonnage 2020 [kilo]
21	06012090 Bulbs, tubers, tuberous roots, corms, crowns, and rhizomes in growth or in bloom (except edible bulbs, tubers or tuberous roots, and orchids, hyacinths, narcissi and tulips and chicory plants and roots).	1071705
22	06029045 Cuttings with roots and young plants of trees and bushes (except fruit, nut and forest trees and bushes).	741112
23	06011020 Narcissi bulbs, dormant or not in bloom	705447
24	06049091 Leaves, branches and other plant parts without flowers or flower buds, and grass used for bouquets or ornamentally, only dried.	533025
25	06022080 Fruit trees and bushes, also grafted, the type that carries edible fruits or nuts, except citrus fruit and grapevines.	481309
26	06031920 Buttercups and buds, cut, fresh, used for bouquets or ornamentally.	428276
27	06031400 Cut chrysanthemum and chrysanthemum buds used for bouquets or ornamentally, fresh.	373015
28	06011010 Hyacinth bulbs, dormant or not in bloom.	367092
29	06022020 Fruit trees and bushes with bare roots, also grafted, of the type that carry edible fruits or nuts except grapevines.	316437
30	06042040 Branches of conifers, fresh for use as decorative greenery.	308314
31	06031200 Cut carnations and carnation buds used for bouquets or decorations, fresh.	253474
32	06022030 Citrus trees and bushes, also grafted, except with bare roots.	181469
33	06024000 Rose plants, also budded or grafted.	109110
34	06031500 Lilies Lilium types and buds used for bouquets or for decorations, cut, fresh.	77240
35	06031300 Cut orchids and orchid buds, used for bouquets or decoration, fresh.	69411
36	06031910 Cut gladiolus and gladiolus buds used for bouquets or decoration, fresh.	50572
37	06049019 Moss and lichen, except reindeer moss.	45646
38	06042019 Moss and lichen suited for bouquets or decorations, fresh (except reindeer moss).	25253
39	06012010 Chicory plants and roots (except chicory roots of the type Cichorium intybus sativum).	20974
40	06011040 Gladiolus bulbs, dormant or not in bloom.	10117
41	06022010 Grapevines with roots, also grafted.	6039
42	06029020 Pineapple plants	5324
43	06042011 Reindeer moss, used for bouquets or decoration, fresh.	1929
44	06029010 Mycelium	802
45	06049011 Reindeer moss	9

Source: Statistics Denmark – https://www.dst.dk/da/Statistik/emner/udenrigsøkonomi/udenrigshandel

Appendix 3. Questionnaires

Appendix 3.1 Questionnaires for the analysis laboratories

Is your laboratory involved in analysis of pesticides in flowers?

☐ Yes
☐ No

Does the analysed flowers origin from countries outside the EU?

☐ Yes
☐ No
☐ I am not aware of this

Are you familiar with inspections of flowers with respect to pesticide residue levels?

☐ Yes
☐ No

Are you familiar with national maximum limits for pesticide residues in flowers?

☐ Yes
☐ No

Are you familiar with unpublished reports or data of the analysis of pesticides in flowers?

☐ Yes
☐ No

Do you have any comment or relevant information concerning the subject? (optional)

Do you grant that your laboratory may be contacted for further questions concerning the case?

☐ Yes, please contact_____
☐ No

Appendix 3.2 Questionnaires for flower shops, nurseries, and horticultural markets

Information about range of flowers.

What type of flower products do you sell?

- ☐ Potted plants
- ☐ Bulbs
- ☐ Cut flowers
- ☐ Others

Information about who purchase flower products.

Who buys your flower products?

- ☐ Private consumers
- ☐ Export
- ☐ Supermarkets
- ☐ Flower shops
- ☐ Others

Information about from where the flower products sold on the Danish market originate.

Where are your flower products purchased?

- ☐ Danish wholesalers
- ☐ Foreign wholesalers
- ☐ Dutch auction houses
- ☐ Directly from manufacturers within the EU
- ☐ Directly from manufacturers outside the EU
- ☐ Others

Do you know from which countries outside the EU you purchase flowers?

- ☐ Ecuador
- ☐ Ethiopia
- ☐ Israel
- ☐ Kenya
- ☐ Uganda
- ☐ Thailand
- ☐ Zambia
- ☐ South Africa
- ☐ Other countries
- ☐ Don’t know

Information about the use of certification schemes.

Do you demand certification schemes for your flower products?

- ☐ Always
- ☐ In most cases
- ☐ Sometimes
- ☐ Rarely
- ☐ Never
- ☐ Don’t know

Which certification schemes do you know about?

- ☐ FFP – Fair Flowers Fair Plants
- ☐ FLO – Fairtrade Labelling Organization, Max Havelaar
- ☐ FLP – Flower Label Programme
- ☐ Rainforest Alliance – Flowers and Ferns
- ☐ Others

How many of your flower products are organic?

- ☐ None
- ☐ Less than 20%
- ☐ 20-40%
- ☐ 40-60%
- ☐ 60-80%
- ☐ 80-100%
- ☐ Don’t know

Survey of pesticides in flowers from countries outside the EU - Preliminary project

Within flower production, several pesticides are used, i.a., to control pests and plant diseases. The objective of this project is to shed light on which pesticides are used in the production of plants in countries outside the EU, and also to obtain an overall view of the existing knowledge about the content of pesticide residues in flower products that are imported from other countries. This project focuses on products such as cut flowers, potted plants, and flower bulbs that are intended to be used by the consumer.

The survey showed that pesticides are being used in imported flowers and associated products, and this also includes pesticides that are not allowed for use in the EU.

A large amount of the products are imported in particular into the Netherlands and Germany, from which they are distributed to Denmark among others.

It has been difficult to identify what the countries of origin are and, therefore, which specific pesticides can be used in specific products. The pesticides and quantities involved depend on the type of product and the country of production, which has not been definitively identified.

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