Approaches to Training and Support for Analysis in the Trade Agreements Sector

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Approaches to Training and Support for Analysis in the Trade Agreements Sector[1]

Recommendations

The Trade Analysis Unit staff should, in the near term:

1. Focus on applying recently acquired skills in reports of interest to the Ministry and other offices in TAS
2. Individual staff members begin to develop knowledge of topic areas such as NAMA, Agriculture, and Services.
3. Begin to establish credibility and connections with other research organizations both within Egypt and with the international trade research community.
4. Finally that TAU develop, and become a source of expertise on an integrated, validated trade and production data base for Egypt, as well as international data bases important to understanding Egyptian trade issues.

In the longer term TAU staff members need to develop deeper knowledge and experience in specific analytical tools and techniques, partly through on-the-job training, and partly through selective training opportunities. It is my sense is that TAU staff has been provided an overview of many of the relevant economic concepts related to conducting applied trade analysis, however they have not had much deep or sustained training in specific important areas, such as partial equilibrium modeling and data development. Some TAU staff are currently attending training at Sussex University and this training may be deeper and more sustained than other training activities. A key determinant of the effectiveness of the training is whether staff can apply the concepts and deal with the accompanying data challenges confidently in internal Ministry reports.

I recommend that over the next couple of years that:

1. As the TAU gains experience in making more contributions to Ministry reports, that selected staff members begin to specialize in certain analytical areas, such as partial equilibrium models, econometrics or statistical analysis, and general equilibrium modeling. In addition each TAU member should become experts on specific domestic data sources, both inside and outside the Ministry, and international trade related databases, such as Comtrade, WITS, MacMAp, Eurostat, and the US Dataweb.
2. More in depth, highly selective, and focused training should be provided for specific individuals in their topic and database areas. The topic specific training needs to be structured so that the topic is covered in depth in a relatively short period of time and an applied research report is written by the trainee as part of the course, but likely over a period of a month or two after the classroom or structured part of the course is completed. Database training can often be acquired through online tutorials, repeated use, or in some international databases cases training is provided by international agencies, especially for developing countries.
3. The topics should be Ministry relevant and the report should be reviewed by Ministry staff and an experienced trainer for relevance and technical quality.

Other TAS staff may benefit from some overview training on analytical methods and databases as previously provided to TAU staff. Attending courses such as the GTAP short course would help develop educated consumers of either original analytical results generated by TAU or of literature summarized by TAU staff. However I would not generally

[1] This report focuses on the Trade Analysis Unit and its interactions with other TAS units.

expect that this training to be extensive. Bringing some trainers with applied policy experience to Egypt to work with TAU on joint presentations to other TAS staff may be effective. This will depend on the credibility that TAU staff develop within the Ministry. It is unlikely that TAU staff will develop significant Computable General Equilibrium (CGE) modeling credibility any time soon, but Partial Equilibrium (PE) modeling credibility can be developed relative quickly.

Background

Between July 24 and August 3, 2006 I worked and met with TAS staff from the Trade Analysis Unit, CD/WTO, CD/BMA, and other departments. I also met with Mr. Abd El Rahman Fawzy to discuss his ideas and concerns regarding the operation and role of the Trade Analysis Unit within TAS. In addition to staff from these units I had a brief discussion with the TAS Information and IT department. I also met with Nathan staff Tim Buehrer, Rachid Benjelloun, Tom Hutcheson, Peter Minor, and Steven Magiera. The objective of my meetings was two fold, to assess possible approaches to training and support for analysis in the TAS, and to provide seminars and personal consultation on the role of analytics within US government policy making.

During the course of my discussions with TAS and Nathan staff it became apparent that the TAU was a relatively isolated unit that had been undertaking numerous analytical training exercises during the past year or so, without regular and significant involvement in day to day work within the Ministry conducted by other TAS units. The general objective of the training was to build the analytical capacity within TAS to provide quantitative economic analysis of possible trade policy changes to Ministry officials. It has been my experience that quantitative analysis of trade policies in a governmental setting needs to be conducted in close collaboration with units that have policy responsibility for the topic being analyzed. A few limited applications of this training had been undertaken, for example an examination of the public interest in a porcelain anti dumping case and an assessment of the impact of Qualified Industrial Zones.

Among the training conducted for TAU staff included staff taking the Global Trade Analysis Project's short course in computable general equilibrium modeling, working with Nathan Principal Associate Peter Minor, a GTAP instructor in the short course, on an analysis of possible impacts on Egypt from the Doha Round, working with consultant Miles Light to build a social accounting matrix of the Egyptian economy for inclusion in the GTAP data base, and working with Denise Konan on the development of a single country model of the Egyptian economy. Other training has been provided by the EU on items such as the TAPES partial equilibrium model (I was unable to find any official documentation on this model, however Noura Abdelwahab shared copies of both a GAMs and Excel version of this model. The Excel version is closely related to the COMPAS model developed by Joe Francois and Keith Hall, while Hall was at the USITC.) I understand that the current training at Sussex University is more in depth and extensive than past training, and it will be useful to assess how this deeper training translates into applied analysis within the Ministry.

More specific recommendations – many of these near term recommendations are related to my perception of the "stove pipe" environment across TAS units. My comments are focused on the TAU, however I sense that this issue cuts across other units of TAS and limits the ability of the Ministry to make the most effective use of its available resources.

Focus on applying recently acquired skills in reports of interest to the Ministry and other offices in TAS.

TAU staff should begin preparing "foundational" reports on specific commodity and service sectors. Topics for these reports should be developed through interaction and

recommendations with other relevant offices within TAS and the Ministry. These reports should be prepared when TAU staff are not working on Ministry requested priority reports. These reports may or may not include the application of the analytical tools TAU has been trained in. These reports are intended more to develop sector relevant expertise, so that when the analyst applies analytical tools in the future they have a stronger foundation upon which to build.

I recommend that these reports be prepared largely by individual staff members, perhaps working jointly with colleagues outside of TAU. I am providing some possible examples of the form of these foundational reports that staff at the USITC prepare, often as training for new employees to gain experience and familiarity with the structure and data issues in a specific sector of the economy (see attached reports on Organic Commodity Chemicals and Cut Flowers.) TAU staff should develop professional links with other TAS units, other relevant Ministries (such as those responsible for agriculture and statistics), and relevant private sector interest groups. Knowledge of relevant counter parts and developing professional relationships with these groups can be as important as technical knowledge of economic modeling. Writing these reports and developing these relationships will require self motivation and interpersonal skills. TAU staff, overtime, should concentrate on specific sectors of the economy (see next recommendation) and as they complete additional reports their knowledge of data, the policy environment, and relevant actors in the broad sectors will increase, raising their overall credibility within TAS, the Ministry, and outside organizations.

Individual staff members begin to develop knowledge of topic areas such as NAMA, Agriculture, and Services, as well as specific domestic data sources and international databases.

TAU needs to identify and develop individual staff member's expertise in broad areas of the economy. Other units in TAS need to know who in TAU is the person who has developed the data, literature, and policy knowledge of a particular sector, whether related to WTO, BMA, EU, or other contexts. This will help establish cross unit links and help TAU staff focus their energies in specific areas. There are often links between a sector responsibility and the need for knowledge of specific tools. For instance if you are focused on agriculture you are likely to need to develop expertise in partial equilibrium modeling, some general equilibrium modeling, agricultural databases at FAO and OECD, estimating ad valorem equivalents for TRQs and specific tariffs, understanding the WTO URA agreement on agriculture, sensitive agricultural products, understanding tariff escalation, and the role of SPS issues in trade. If you are focused on NAMA you are likely to need to develop expertise in partial equilibrium modeling, general equilibrium modeling, knowledge of commodity specific data bases, special and differential treatment, sectoral negotiations, and the importance of TBT's and standards. Some NAMA products, such as textiles and apparel also face TRQ measurement issues. If you are working on services trade knowledge of general equilibrium models and econometrics are likely to be more important than partial equilibrium models, knowledge of the challenges related to services data and the role of FDI, and knowledge of the GATS agreement and how services trade is treated quite differently in the WTO setting and in bilateral settings. These are not exhaustive lists. They are meant to illustrate that the needs of analysts can vary quite substantially depending on the sector they work on, and that allowing specific TAU analysts to develop this specialized knowledge will help determine their further training needs and build their internal credibility and effectiveness within TAS.

Begin to establish credibility and connections with other research organizations both within Egypt and with the international trade research community.

It is important that TAU staff members reach out to other centers of expertise on trade and economic issues within Egypt and within the international trade research community. Two regular channels for this kind of connection is either contact during a particular research project, where you approach other individuals or institutions that may have knowledge or information relevant to the research project, or through presenting completed research products for review, comment, or a formal research presentation such as a small seminar or conference paper. It is difficult to build expertise and credibility in applied policy analysis if one works in isolation. Developing contacts and presenting work in professional settings helps improve the products by drawing on a more diverse set of knowledge and perspectives often resident in outside institutions, as well raising the profile of the presenter and the TAU as an institution in the eyes of other organizations conducing similar work.

Finally that TAU develop, and become a source of expertise on an integrated, validated trade and production data base for Egypt, as well as international data bases important to understanding the Egyptian trade .

There seems to be a very big gap in the basic data area. TAU staff need to know the strengths and weaknesses of the general data bases available within and outside of TAS, they need to be able to access quickly the relevant data from domestic and international data sources, and they need to understand how to solve data puzzles they will encounter regularly. Working on the two previous recommendations will help develop these skills, but some focus and support needs to be provided TAU staff in this area. Developing knowledge of domestic data bases requires TAU staff to get their “hands dirty” with the data and start working on developing an internally, economically consistent (complete, balanced supply and utilization tables) domestic data base for industries or commodities of most importance to the Ministry. These efforts could be supported by the TAS IT unit, but will also require the TAU staff to sit down and identify where data doesn’t seem to make sense and start to develop approaches to build an appropriate database and get other TAS and Ministry to units to agree on such a database.

TAU staff should also develop expertise on international data sources, such as Comtrade, WITS, MacMAp, Eurostat and the US Data Web. On the international side some training is likely to be available on the use of UN and World Bank data sets. I can provide further information on this kind of training if requested. In addition staff should try to familiarize themselves with the FAO extensive database on agricultural production, consumption and trade and the OECD database on OECD agricultural policies.

A more difficult training issue relates to solving large scale data puzzles, for example how to build a social accounting matrix for Egypt. A consultant recently worked on developing such a database with TAU staff for use in the GTAP database. It is important for TAU staff to develop the ability to update and expand such a database on their own, with perhaps only guidance from an outside consultant. In addition they need the ability to effectively review such a database after submission and revisions have been completed by a third party. Solving these data puzzles are some of the most difficult, yet valuable, skills to acquire. Experience is the best teacher, however some groups, such as the Center of Policy Studies at Monash University in Australia have significant experience in this area that may be transferable.

Longer Term Training Recommendations

As the TAU gains experience in making more contributions to Ministry reports, that selected staff members begin to specialize in certain analytical areas, such as partial equilibrium models, econometrics or statistical analysis, and general equilibrium modeling.

As mentioned in the short term training recommendations TAU staff should build foundational knowledge of specific sectors and issues. As they build this knowledge it will become more apparent which analytical techniques they will need to develop more deeply. For instance analysis in the agricultural sector is often focused on very specific commodities with complicated government policies (EU and US sugar for instance.) Analyzing these kinds of commodities in a general equilibrium or econometric model poses significant challenges that are difficult to overcome. However partial equilibrium models can often handle these challenges more easily, if the analyst is familiar with both the requirements of the sector and the capabilities of the analytical tool being applied. There are many choices of partial equilibrium models to choose from, providing an overview of all of them may be somewhat useful, but more useful in the long run is determining which type of partial equilibrium model is most relevant and to develop significant and deep expertise in that model. Similar arguments can be made for general equilibrium models, econometric and other data analysis techniques. This is the kind of expertise generally developed when a PhD candidate writes a dissertation, however TAU is not likely to have the luxury of sending staff to PhD programs and wait many years for that expertise.[2] That is why I make the following recommendation.

More in depth, highly selective, and focused training should be provided for specific individuals in their topic areas. This training needs to be structured so that the topic is covered in depth in a relatively short period of time (a week or two) and an applied research report is written by the trainee as part of the course, but likely over a period of a month or two after the classroom or structured part of the course is completed.

As mentioned earlier it appears that TAU staff have been provided with overviews of a number of topic areas, but have had limited opportunities to learn or apply these tools in an in depth structured environment. The GTAP short course and the current training being undertaken in Sussex may be exceptions, however even the GTAP short course barely touches the surface of the skills needed to modify CGE models to specific circumstances. Generally one learns these type of skills, whether CGE, partial equilibrium or econometric through extended application under the guidance of more experienced users, such as thesis advisor. It may be possible for TAU staff to begin to develop similar experience through a carefully crafted short program that requires a follow-up paper similar to a mini thesis, that calls for on going feedback from the instructor after the intensive course work to deal with data and technical issues encountered when one gets into the details of the topic, as well as review at draft stages with comments, and a final version of the study to be approved by the instructor and relevant Ministry staff. This paper would be different from the foundational work as its emphasis would be on the analytical tools being applied, any modifications required of those tools, and a discussion of the data strengths and weaknesses, as well as a review of similar literature.

The topics should be Ministry relevant and the report should be reviewed by Ministry staff and an experienced trainer for relevance and technical quality.

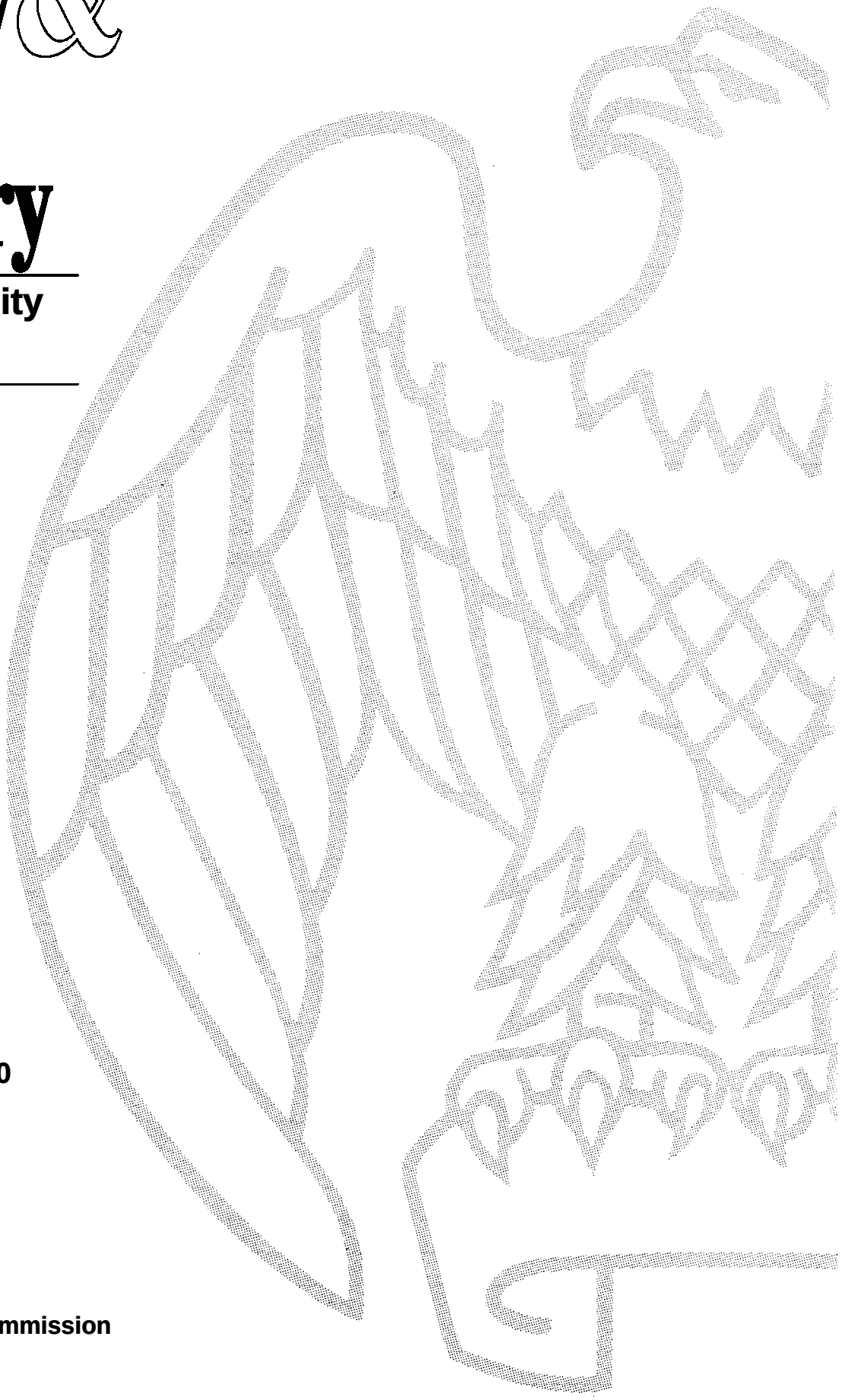
This recommendation is to ensure that the application in the above recommendation is to a topic of interest to the Ministry, and that some sort of internal review mechanism be established for studies generated by TAU (or even other units.) The objectives of the review mechanism can be twofold – first to ensure that Ministry interests are served, and second to increase exposure of TAU to other parts of the Ministry. It is likely that review of the

[2] Also note that in applied policy setting new PhD's often need to be retrained in detailed, applied approaches to policy analysis compared to academic, or even the broad policy settings experienced in places like the World Bank and IMF. See for example the recent World Bank study on the Doha round, that is quite well done, but lacks the country and commodity specific details required by most countries' policy makers.

technical application is done by someone else in TAU or outside the Ministry, but that policy, data, and sectoral contributions will benefit from internal Ministry expertise.

Industry & Trade Summary

Organic Commodity Chemicals



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PREFACE

In 1991 the United States International Trade Commission initiated its current *Industry and Trade Summary* series of informational reports on the thousands of products imported into and exported from the United States. Each summary addresses a different commodity/industry area and contains information on product uses, U.S. and foreign producers, and customs treatment. Also included is an analysis of the basic factors affecting trends in consumption, production, and trade of the commodity, as well as those bearing on the competitiveness of U.S. industries in domestic and foreign markets.[1] This report on organic commodity chemicals covers the period 1997-2001.

[1] The information and analysis provided in this report are for the purposes of this report only. Nothing in this report should be construed to indicate how the Commission would find in an investigation conducted under statutory authority covering the same or similar subject matter.

CONTENTS

Page

Preface i

Abstract 1

Introduction 3

U.S. industry profile 7

U.S. market 11

Consumer characteristics and factors affecting demand 11
Consumption 11
Production 12

U.S. trade 15

Overview 15
U.S. imports 17
Principal suppliers and import levels 17
Tariff and nontariff measures 17
U.S. government trade-related investigations 20
U.S. exports 20
Principal markets and export levels 21
Foreign trade measures 21

Foreign industry profile 22

North America 22
Asia 23
Europe 25
Middle East 26
Others 26

CONTENTS-*Continued*

Page

Appendixes

A. Tariff and trade agreement terms A-1
B. Statistical tables B-1

Figures

1. Benzene chain 4
2. Xylene chain 5
3. Chemical mergers and acquisitions worldwide, 1997-2001 8

Tables

1. Organic commodity chemicals: Harmonized Tariff Schedule classification, 2001 7
2. Organic commodity chemicals: import-to-consumption ratio, 1997-2001 12
3. Organic commodity chemicals: U.S. production, exports of domestic merchandise, imports for consumption, and apparent consumption, 1997-2001 13
4. Organic commodity chemicals: productivity and unit labor costs, 1997-2001 15
5. Relative price history of crude petroleum and natural gas, 1987-2001 15
6. Trade balance of certain commodity chemicals, 1997-2001 16
7. Organic commodity chemicals: Harmonized Tariff Schedule subheading; description; U.S. column 1, Special, and column 2 rates of duty as of Jan. 1, 2002; U.S. imports, 2001; and U.S. exports, 2001 18

B-1. Organic commodity chemicals: U.S. imports for consumption, by principal sources, 1997-2001 . . . . . B-2
B-2. Organic commodity chemicals: U.S. exports of domestic merchandise, by principal markets, 1997-2001 . . . . . B-7

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ABSTRACT

This report addresses trade and industry conditions for the organic commodity chemicals, also known as petrochemicals, a category of chemicals derived from crude petroleum. These chemicals are used primarily as intermediates in the production of a wide variety of downstream goods, including plastics and apparel. The period of study is from 1997 through 2001.

- The U.S. organic commodity chemicals industry produced an average $18.9 billion of these goods each year during 1997-2001. The average annual trade surplus during this period was $600 million.

- The largest U.S. export markets of these products were Mexico and Canada, which accounted for approximately 41 percent of all exports by value (or $3.17 billion) in 2001. Major U.S. import sources included Canada, Venezuela, and Nigeria, which together accounted for approximately 53 percent of these imports by value (or $2.49 billion) in 2001.

- Consumers of these chemicals typically use them as intermediates in numerous products, including plastics, adhesives, and nylon fibers. There is little or no quality differentiation between domestically-produced commodity chemicals and U.S. imports. The global market is highly competitive and large fluctuations in domestic production, imports, and exports regularly occur. These fluctuations are caused by a variety of factors that include demand for downstream goods, cost of feedstocks, transportation costs, and producer efficiency. In particular, the general economic decline in 2001 contributed to the decline in U.S. production levels for that year.

INTRODUCTION

The organic commodity chemicals are a group of petroleum-derivative chemicals (also known as petrochemicals) used as intermediates to produce other chemicals, which, in turn, are used to manufacture a wide variety of end-use products, including construction materials, apparel, adhesives, plastics, and tires (figures 1 and 2). The majority of the organic commodity chemicals are derived from benzene, a petroleum derivative itself, which has an unsaturated ring of six carbon atoms (also known as an aromatic ring).[1] Examples of specific compounds in this group include ethylbenzene, styrene, cumene, phenol, cyclohexane, aniline, *ortho*-xylene, *meta*-xylene, *para*-xylene, and terephthalic acid.

As commodities, the chemicals produced by one manufacturer are virtually indistinguishable from those of another manufacturer, given the same levels of purity. This fungibility of goods allows consumers to purchase similar product from a wide variety of suppliers, making price the dominant economic factor in purchasing decisions. Total domestic production of the organic commodity chemicals in 2001 approached $18.2 billion. A brief summary of the six largest organic commodity chemicals, ranked by domestic production value in 2001, follows (for more information on production levels, see the section later in this report entitled "U.S. Market").

Ethylbenzene is an intermediary chemical, 99 percent of which is used in the production of styrene monomer,[2] which is itself a precursor of polystyrene and other materials. Ethylbenzene is commonly produced by the alkylation of benzene with ethylene in the presence of aluminum chloride catalyst. Recently, several manufacturers have begun using zeolite catalysts in place of aluminum chloride to improve yields and purity levels. In addition to the various manufacturing processes, it can also be separated directly from crude petroleum, although industry sources state that this method of production is seldom used because of typically higher production costs.[3] Ethylbenzene is primarily used captively, with little reaching the merchant market. As a result, U.S. price data are not readily available, although some plants use an internal charge to allocate costs. Domestic production in 2001 was valued at $2.5 billion.

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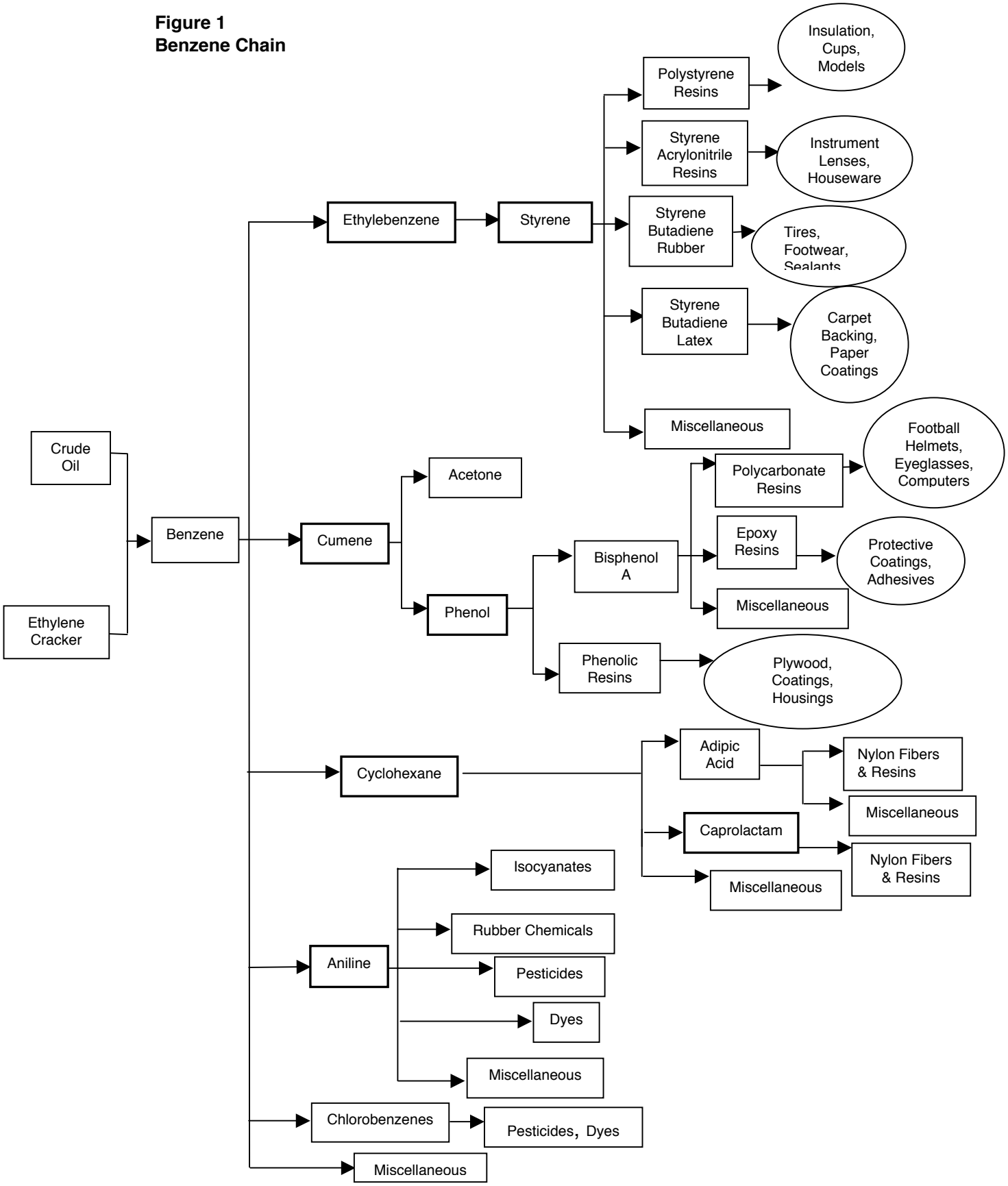
[1] Although the xylenes are usually produced directly from crude petroleum or toluene rather than from benzene, they share the aromatic ring structure of the other benzene derivatives and are sold in a similar fashion, and are thus included in the scope of this report. Highly specialized benzene derivatives, usually produced in smaller quantities, are not included in the organic commodity chemicals classification and are not considered in this report.

[2] "Ethylbenzene," Apr. 30, 2001, found at *http://www.chemexpo.com/news/ profile010430.cfm*, retrieved Jan. 7, 2002.

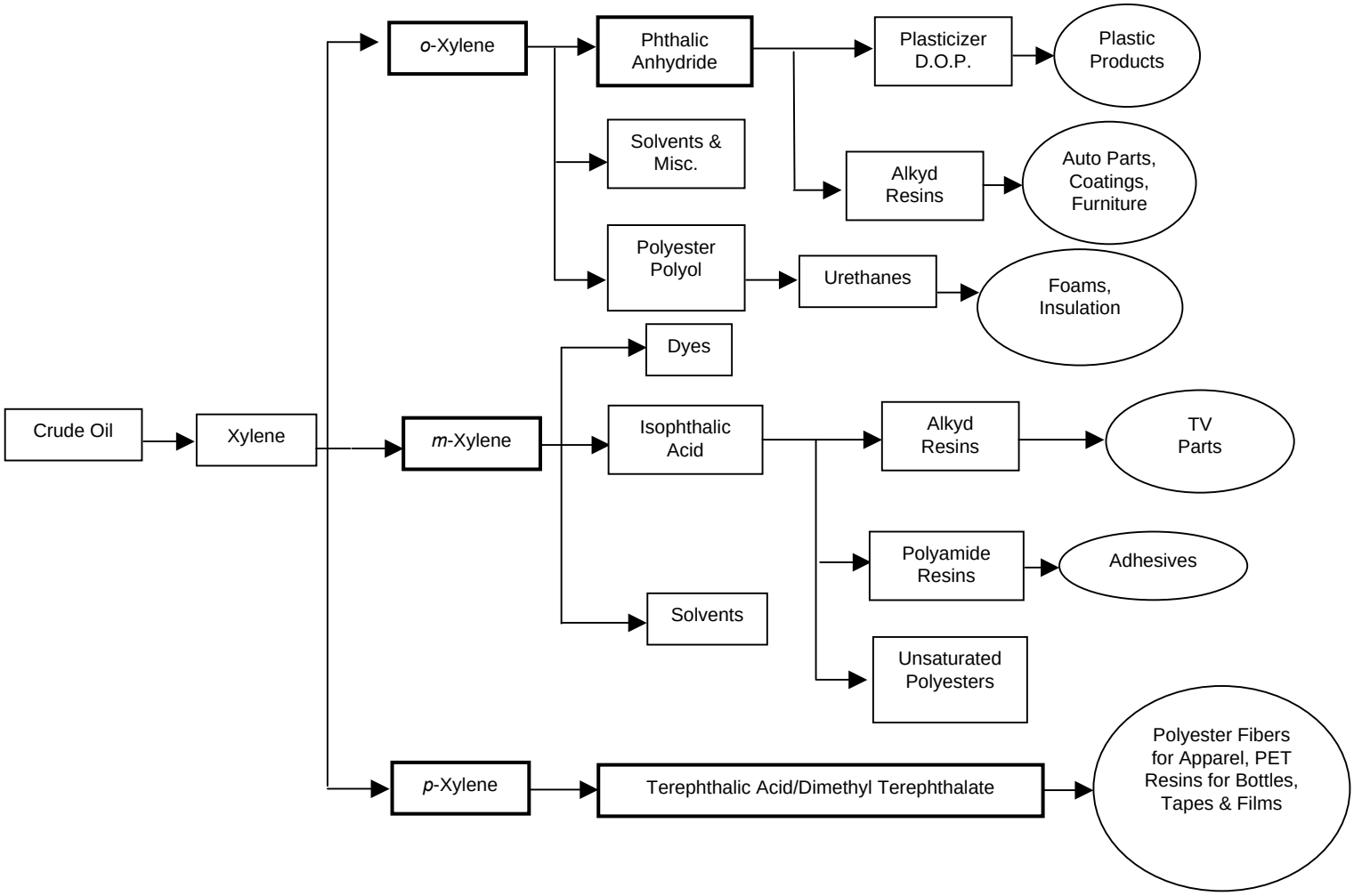
[3] Commission telephone conversations with industry sources.

Figure 1
Benzene Chain



Source: American Chemistry Council (ACC). Modified by staff of the U.S. International Trade Commission. Reprinted with permission of the ACC.

Figure 2
Xylene Chain



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Styrene monomer (or simply "styrene") is made predominantly through dehydrogenation of ethylbenzene, although a major producer uses an alternative method of oxidation of ethylbenzene, which produces co-products propylene oxide and styrene. Uses for styrene are varied, including the production of polystyrene (accounting for 66 percent of styrene consumption), plastics, rubber, and resins.[4] These secondary products are then used in the manufacture of automotive interiors, boat hulls, paper coatings, pipes, and CD cases. Domestic styrene production in 2001 was valued at $1.9 billion.

Terephthalic acid is produced primarily from *para*-xylene feedstocks. As an intermediate chemical, it is further processed into purified terephthalic acid (PTA). Approximately 50 percent of PTA is used for the production of polyethylene terephthalate (PET) resins and 43 percent is used for the production of polyester fibers.[5] Domestic production in 2001 was valued at $2.1 billion.

Para-xylene (*p*-xylene) is one of three distinct isomers[6] of the xylene molecule, the other two being *ortho*-xylene (*o*-xylene) and *meta*-xylene (*m*-xylene). *p*-Xylene is used almost exclusively for production of purified terephthalic acid and dimethyl terephthalate, which, in turn, are used in polyester fiber for textiles, PET resins for beverage containers, and a variety of films and other resins.[7] Domestic production in 2001 was valued at $1.8 billion.

Virtually all domestic cumene production is oxidized to cumene hydroperoxide, which is then cleaved catalytically to produce phenol and acetone.[8] This method results in approximately 0.62 pounds of acetone per pound of phenol produced. Domestic cumene production in 2001 was valued at $1.5 billion. End-uses for phenol include bisphenol-A (primarily used in the manufacture of epoxy resins and polycarbonates), phenolic resins, and caprolactam. Domestic phenol production in 2001 was valued at $1.4 billion.

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[4] "Styrene," May 14, 2001, found at *http://www.chemexpo.com/news/profile010430.cfm*, retrieved Jan. 7, 2002.

[5] "PTA/DMT," *Chemical Market Reporter*, Oct. 22, 2001.

[6] Isomers are compounds that have the same molecular formula but different structural formulas.

[7] "Paraxylene," May 11, 1998, found at *http://www.chemexpo.com/news/ profile980515.cfm*, retrieved Jan. 7, 2002.

[8] "Cumene," Mar. 22, 1999, found at *http://www.chemexpo.com/news/profile990322.cfm*, retrieved Jan.7, 2002.

U.S. INDUSTRY PROFILE

Organic commodity chemicals, as defined in this report, are classified in chapter 29 of the Harmonized Tariff Schedule (HTS) of the United States. A complete listing can be found in table 1. Applicable North American Industry Classification System (NAICS) U.S. National Industry codes include 325110, Petrochemical Manufacturing, and 325199, All Other Basic Organic Chemical Manufacturing.

Table 1
Organic commodity chemicals: Harmonized Tariff Schedule classification, 2001

HTS subheading	Chemical name
2902.11.00	Cyclohexane
2902.19.00	Dicyclopentadiene and other cyclanes, cyclenes, and cycloterpenes
2902.41.00	*ortho*-Xylene
2902.42.00	*meta*-Xylene
2902.43.00	*para*-Xylene
2902.50.00	Styrene
2902.60.00	Ethylbenzene
2902.70.00	Cumene
2902.90.10	Pseudocumene
2902.90.20	Acenaphthene, chrysene, cymene, dimethylnapthalenes, fluoranthene, fluorene, indene, mesitylene, methylanthracene, methylnaphthalene, phenanthrene and pyrene
2902.90.30	Alkylbenzenes (including dodecylbenzene) and polyalkylbenzenes
2902.90.40	Anthracene; and 1,4-di-(2- methylstyryl)benzene
2902.90.60	Biphenyl (diphenyl), in flakes
2902.90.90	Other cyclic hydrocarbons
2906.12.00	Cyclohexanol, methylcyclohexanols and dimethylcyclohexanols
2907.11.00	Phenol (hydroxybenzene) and its salts
2917.35.00	Phthalic anhydride
2917.36.00	Terephthalic acid and its salts
2917.37.00	Dimethyl terephthalate
2921.41.10	Aniline
2921.41.20	Aniline salts
2933.71.00	6-Hexanelactam (epsilon-caprolactam)

Source: USITC, Harmonized Tariff Schedule of the United States, 2002.

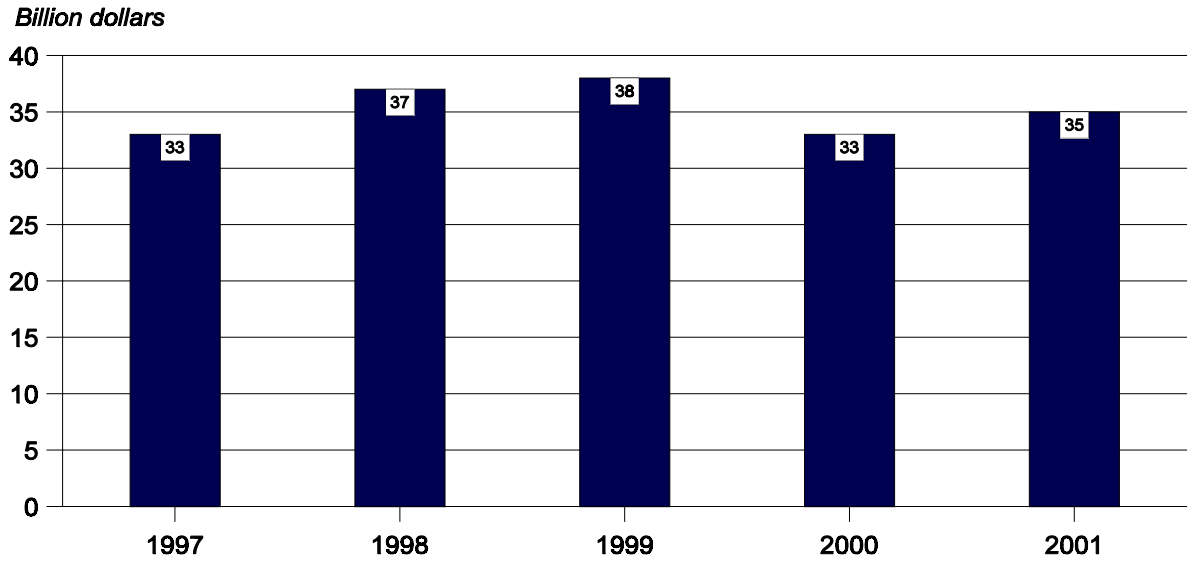
Producers of these chemicals include a combination of petroleum refineries and traditional chemical manufacturers. For example, refineries are the major producers of the xylene isomers, which are direct derivatives of crude petroleum, and of the immediate downstream products of crude petroleum. Chemical manufacturers are the major producers of styrene, caprolactam, and aniline. However, both types of firms do produce both groups of products.

The domestic chemical industry has undergone significant consolidation via mergers and acquisitions during 1997-2001. In this period, *Chemical and Engineering News* changed its annual overview of domestic chemicals producers from the top 100 producers to the top 75.[9] This change was a result of the extensive consolidation in the chemicals industry of companies of all sizes. The annual value of mergers and acquisitions among chemical producers worldwide ranged from $33 billion in 1997 and 2000 to $38 billion in 1999 (see

[9] William J. Storck, "Top 100 Shrinks to 75," *Chemical & Engineering News*, May 3, 1999, p. 19.

figure 3). The largest acquisition in the United States during this period was Dow's $9 billion purchase of Union Carbide, which was announced in 1999 but did not close until 2001. Other notable consolidations among the petrochemical producers included the creation of ExxonMobil Chemical (1999), Lyondell Chemical's acquisition of Arco Chemical (1998), and the creation of two joint ventures (Chevron Phillips Chemical LP (2000) and Equistar Chemicals LP (1997)).[10] Because of economies of scale and the highly competitive marketplace, midlevel companies are often unable to compete effectively in the petrochemicals markets.[11] Small companies (corporations with sales under $200 million) often do not produce organic commodity chemicals but instead produce specialty chemicals. These specialty chemicals are marketed on factors other than price. Specialty chemicals are not included in the scope of this summary.

Figure 3
Chemical mergers and acquisitions worldwide, 1997-2001



Source: Compiled from data provided by Young and Partners, LLC. Reprinted with permission of Young and Partners, LLC.

[10] Joseph Chang, "The Forecast for Petchems," *Chemical Market Reporter,* Oct. 15, 2001, p. e32.

[11] Sean Milmo, "Taking on the Petchems Challenge," *Chemical Market Reporter,* Oct. 15, 2001, p. e22.

In addition to consolidation within the domestic industry during 1997-2001, there was also an increase in joint ventures in foreign production facilities, particularly in the Middle East, given the large indigenous supplies of crude petroleum. Two examples of such investment include the startup in 2000 of Saudi Chevron's cyclohexane facility in Al Jubail, Saudi Arabia,[12] and the prospective startup in 2004 of an aniline production facility in Shanghai, China.[13] Globalization is likely to continue because of economies of scale and to ensure reliable access to crude petroleum.[14]

Most of the organic commodity chemicals have more than 10 domestic producers, even after the recent increase in mergers. No single company is a major producer of all of the organic commodity chemicals. Instead, firms tend to focus on a few of the related products. For example, the largest producers of styrene are also the largest producers of ethylbenzene, a precursor of styrene. The petroleum refineries, such as BP, ExxonMobil, Shell, and Sunoco, tend to be the major producers of the xylene isomers, since these products are usually produced directly from crude petroleum.

Domestic manufacturing of organic commodity chemicals is centered in the Louisiana/Texas area. Close proximity to a deep water port, natural stores of crude petroleum, and refining facilities all serve to minimize transportation costs and allow for multiple processing steps to take place in a single location. A large majority of the major domestic producers have production facilities in this area.

Overall, the domestic chemical manufacturing industry produced $420 billion in industry shipments in 1997.[15] Chemicals and allied products ranged from 1.9 percent to 2.0 percent of gross domestic product (GDP) between 1997 and 2000.[16] The domestic petrochemical manufacturing sector produced $20.5 billion in industry shipments in 1997, with 54 establishments within the United States.[17] The U.S. petrochemical manufacturing industry had 10,943 paid employees and an average payroll of $60,611 per employee.[18]

Many of the commodity chemicals are available for purchase at specific purity levels, which minimizes the difficulty of switching supply sources. As a result, pricing and currency fluctuations are major determinants in choosing suppliers.[19] Because most product is sold free on board, freight costs and, by extension, distance between buyer and seller, are also

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[12] "Healthy Demand Is Boosting Fibres on the Mend," *Chemical Market Reporter*, Oct. 2, 2000, pp. 62-63. The facility is a joint venture between Chevron Phillips Chemical Company LLC (CPChem) and Saudi Industrial Investment Group. CPChem, in turn, is a joint venture of ChevronTexaco Corp. and Phillips Petroleum Co. "Saudi Chevron Phillips Company Expands Cyclohexane Capacity," Chevron Phillips Chemical Company LLC, press release, Mar. 7, 2002.

[13] "Aniline," *Chemical Week*, Dec. 12, 2001, p. 31. The planned project would be a joint venture between BASF, Huntsman, Shanghai Chlor-Alkali Chemical, Shanghai Hua Yi, Sinopec, and Sinopec Shanghai Gao Quiao.

[14] Sean Milmo, "Taking on the Petchems Challenge," p. e22.

[15] U.S. Census Bureau, *1997 Economic Census*, NAICS subsector code 325 -- Chemical Manufacturing.

[16] U.S. Department of Commerce, Bureau of Economic Analysis, *Gross Domestic Product by Industry in Current Dollars As a Percentage of Gross Domestic Product, 1994-2000,* Nov. 2, 2001, p. 4.

[17] U.S. Census Bureau, *1997 Economic Census*, NAICS U.S. National Industry code 325110 -- Petrochemical Manufacturing.

[18] Ibid.

[19] McGraw Hill Companies and U.S. Department of Commerce, International Trade Administration, *U.S. Industry & Trade Outlook 2000*, p. 11-6.

relevant. Pricing of the organic commodity chemicals products is often closely tied to benzene prices, which are similarly tied to crude petroleum feedstock prices. The industry uses a combination of long-term pricing contracts and a spot market to conduct sales. Several periodicals regularly publish trade list prices for a variety of these chemicals; however, these prices do not always accurately reflect true contract prices, as many companies consider purchasing terms to be confidential information.

Research and development (R&D) spending in the basic industrial chemicals industry, which includes both organic and inorganic chemicals, increased from $3.95 billion in 1994 to $5.69 billion in 2000.[20] However, R&D spending in 2001 decreased by 7 percent to $5.3 billion, primarily as a result of the poor market conditions in that year.[21] Typically, R&D spending is approximately 5 percent of annual sales and is divided into three different categories: basic research aimed at discovering new scientific facts in the general realm; applied research performed with the intent of using known compounds to achieve a specific goal or result; and developmental research converting scientific knowledge into a form usable by consumers.[22] From 1991 to 2000, total research expenditures in the chemical industry have been divided as follows on average: 11 percent toward basic research, 33 percent toward applied research, and 56 percent toward developmental research.[23]

Feedstock costs are the highest variable cost in production of the organic commodity chemicals.[24] The larger producers integrate feedstocks and derivatives production in order to minimize production costs and price fluctuations. Smaller firms do not possess this integration flexibility, making them more susceptible to variations in feedstock price swings. When feedstock prices rise, manufacturers often lower operating rates or suspend production if price increases are not possible.[25] Some producers have the ability to switch feedstocks in order to obtain better market prices.

The industry has faced numerous challenges during the past few years, many of which continue today, including issues related to the environment, fluctuations in energy prices, varying global demand levels, and changes in the strength of the U.S. dollar.[26] One ongoing environmental challenge that could affect domestic producers' competitiveness in world markets is the required reduction of nitrogen oxides (NO_x) emissions in Texas.[27] In 2000, the U.S. Environmental Protection Agency asked the Texas Natural Resources Conservation Commission (TNRCC) to develop a state implementation plan for the Houston, Dallas-Fort

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[20] T. Kevin Swift et al, *Guide to the Business of Chemistry*, American Chemistry Council (ACC), 2001, p. 85.

[21] Neil Franz, "Economic Woes Hurt Investment in R&D," *Chemical Week*, Dec. 5, 2001, p. 57; also based on conversations with industry sources.

[22] *Guide to the Business of Chemistry*, ACC, 2001, p. 84.

[23] Ibid.

[24] Based on Commission telephone conversations with industry sources.

[25] Malini Hariharan, "Demand Rises as Economies Recover," *Chemical Market Reporter,* May 22, 2000, p. S52.

[26] T. Kevin Swift and Martha Moore, "US Chemical Industry Outlook: Trade and Domestic Demand," *Chemical Market Reporter,* June 18, 2001, p. 33.

[27] "Nitrogen oxides, or NO_x, is the generic term for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts. Many of the nitrogen oxides are colorless and odorless. However, one common pollutant, nitrogen dioxide (NO_2) along with particles in the air can often be seen as a reddish-brown layer over many urban areas. Nitrogen oxides form when fuel is burned at high temperatures, as in a combustion process. The primary sources of NO_x are motor vehicles, electric utilities, and other industrial, commercial, and residential sources that burn fuels." U.S. Environmental Protection Agency, "NO_x: What Is It? Where Does It Come From?", Mar. 22, 2002, found at Internet address *http://www.epa.gov/air/urbanair/nox/what.html,* retrieved Mar. 14, 2003.

Worth, Beaumont, and San Antonio areas to improve air quality.[28] The initial TNRCC proposal to cut NO_x emissions by 90 percent by 2007 would, according to some sources, require significant expense for chemical producers with no corresponding return on investment.[29] In December 2002, however, the Texas Commission on Environmental Quality passed new regulations calling for an 80 percent reduction in NO_X emissions.[30]

U.S. MARKET

Consumer Characteristics and Factors Affecting Demand

Consumers of the organic commodity chemicals are producers of downstream chemical derivatives. Most of the commodity chemicals are available on the merchant market, although some of the these chemicals, such as ethylbenzene, are consumed almost entirely on a captive basis. The markets utilize a combination of long-term contracts and a spot market. In times of excess supply, consumers will utilize the lower-priced spot market to build up inventory levels.

Demand for organic commodity chemicals is closely tied to demand for derivative products, including end products such as nylon, coatings, rubber and plastics. The demand for these, in turn, is linked to established business sectors, such as automobiles and tires, whose economic viability is linked to gross domestic product (GDP) and the state of the world economy. Therefore, the GDP in any year can result in substantial changes in demand for the chemicals covered in this report.

Consumption

Because of the globalization of the markets for organic commodity chemicals, buyers are able to purchase virtually identical product from many different producers, domestic or foreign. As shown in table 2, the import-to-consumption ratio increased from 4.9 percent in 1997 to 5.9 percent in 2000, before declining to 5.8 percent in 2001. According to one industry source, much of the increase from 1997 to 2000 was due to increased imports of styrene. These imports, primarily from Canada, were the result of increased investment in petrochemical manufacturing in Canada in the mid-1990s because of newly discovered stores of natural gas.[31] Ethylbenzene and terephthalic acid have import-to-consumption ratios of 1.2 percent or less because consumers are more likely to import the precursor chemicals (benzene and *para*-xylene, respectively) and then produce the two products onsite.

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[28] Carol Cole, "Lawmakers Propose Tax Break for NO_x Reduction Effort," *Octane Week*, Apr. 23, 2001, p. 1.

[29] Suzanne McElligott, "TNRCC to Decide NO_x Emission Cuts Soon," *Chemical Week*, May 15, 2002, p. 21; and Peck Hwee Sim, " "Gulf Coast: Will Environmental Costs Crimp Growth?", *Chemical Week*, May 15, 2002, p. 19.

[30] "Texas Expects Swift EPA Approval of New Clean Air Rules," *Platt's Oilgram News*, Dec. 18, 2002, p. 6; and "New Ozone Findings Drive Strong Pollution Reduction Plan," Texas Commission on Environmental Quality, Press Release, Dec. 13, 2002. The revised plan, which was expected to be approved by the U.S. Environmental Protection Agency, would also call for a reduction of 64 percent in emissions of certain highly reactive volatile organic compounds.

[31] Peter Fairley, "Canadian Chemicals: Running on Empty," *Chemical Week,* July 19, 2000.

Table 2
Organic commodity chemicals: import-to-consumption ratio, 1997-2001
(Percent, based on dollar values)

Item	1997	1998	1999	2000	2001
Styrene	5.8	5.1	8.9	15.9	24.7
Cumene	13.3	9.6	11.7	14.0	12.4
para-Xylene	13.2	14.2	10.0	12.7	9.4
Cyclohexane	5.7	1.5	1.4	0.1	4.1
Ethylbenzene	([1])	([1])	([1])	([1])	0.8
Phenol (hydroxybenzene)	4.8	5.4	6.0	1.8	0.6
6-Hexanelactam (epsilon-caprolactam)	5.0	4.3	1.6	1.0	0.5
Terephthalic acid and its salts	0.4	0.3	0.7	1.0	1.2
All others	3.7	3.4	3.2	3.0	2.5
Total	4.9	4.3	4.5	5.9	5.8

[1] Less than 0.05 percent.
Source: Based on official statistics from the U.S. Department of Commerce, American Chemistry Council, National Petrochemical & Refiners Association, and U.S. International Trade Commission staff estimates.

Future demand for the organic commodity chemicals depends on the conditions of the world economy. As an example, in September 2000, industry analysts predicted a styrene growth rate of 4.6 percent for the next 5 years, with operating rates as high as 99 percent of capacity.[32] However, the international economic downturn in 2001 resulted in an unforseen decline in demand of 2.6 percent, the first decline in demand in almost 20 years.[33] Operating rates for styrene production declined from 92 percent to 86 percent. Demand decreased to such an extent that industry sources estimate that operating rates and consumption volume in this market will not recover until at least 2006.[34]

Production

Production levels vary in relation to changes in supply and demand. Production levels increased irregularly during 1997-2000, from $19.0 billion to $21.3 billion, before decreasing to $18.2 billion in 2001. Most of the chemicals followed this trend (see table 3), with the exceptions of terephthalic acid, phenol, and cyclohexane.

As noted previously, half of the domestic terephthalic acid output is used in the production of PET resins, and these resins continued to maintain their historical annual growth rate of 15 percent in 2000.[35] As a result, purified terephthalic acid maintained an annual growth rate of 7.4 percent from 1997 through 2000, with a projected rate of 6 percent annually through 2004.[36] Phenol production reached $1.7 billion in 1997, but ranged between $1.2 and $1.6 billion for the period 1998 through 2001.[37] Industry sources state that producers are trying to keep production levels as low as possible because of high feedstock costs in

[32] Peck Hwee Sim, "Warning: Styrene Capacity Shortage Ahead," *Chemical Week*, Sept. 13, 2000, p. 68.
[33] "Styrene Industry to Recover after Dismal 2001," *Oil & Gas Journal*, Feb. 4, 2002, p. 52.
[34] Ibid.
[35] Robert Brown, "PET Market is Resilient Despite U.S. Economic Drop," *Chemical Market Reporter*, July 2, 2001, p. 16.
[36] "PTA/DMT," *Chemical Market Reporter,* Oct. 22, 2001, p. 31.
[37] "Phenol," *Chemweek,* Jan. 9, 2002, p. 31.

Table 3
Organic commodity chemicals: U.S. production, exports of domestic merchandise,[1] imports for consumption,[2] and apparent consumption, 1997-2001

(1,000 dollars)

Item	1997	1998	1999	2000	2001
Ethylbenzene:					
Production	3,200,000	3,192,500	3,291,500	3,302,500	2,505,560
Exports	32,003	19,227	5,561	18,745	3,758
Imports	1,545	269	54	97	19,129
Consumption	3,169,542	3,173,542	3,285,994	3,283,851	2,520,932
Terephthalic acid and its salts:					
Production	1,999,998	1,553,698	1,671,891	2,032,262	2,105,340
Exports	191,064	190,060	144,939	89,492	128,262
Imports	7,613	3,489	10,857	20,481	24,971
Consumption	1,816,546	1,367,127	1,537,809	1,963,251	2,002,048
Styrene:					
Production	3,192,000	2,856,500	2,981,500	3,465,500	1,857,473
Exports	391,039	351,068	627,894	922,257	432,977
Imports	173,427	135,127	231,177	482,223	466,679
Consumption	2,974,388	2,640,560	2,584,784	3,025,466	1,891,175
para-Xylene:					
Production	1,720,400	1,273,800	1,501,100	2,035,500	1,750,000
Exports	234,965	227,558	260,747	440,708	343,664
Imports	226,199	172,838	138,277	232,310	145,758
Consumption	1,711,634	1,219,080	1,378,631	1,827,102	1,552,094
Cumene:					
Production	1,270,500	1,400,700	1,317,840	1,763,000	1,495,887
Exports	44,793	69,482	62,537	123,284	68,371
Imports	188,130	141,985	165,704	265,954	201,185
Consumption	1,413,837	1,473,203	1,421,008	1,905,670	1,628,701
Phenol (hydroxybenzene):					
Production	1,704,010	1,555,840	1,182,500	1,515,000	1,431,000
Exports	96,797	108,867	82,512	157,939	171,069
Imports	81,916	82,689	70,319	25,045	7,793
Consumption	1,689,129	1,529,662	1,170,307	1,382,106	1,267,725
6-Hexanelactam (epsilon-caprolactam):					
Production	1,222,500	1,260,000	1,216,800	1,332,100	1,224,000
Exports	119,004	108,172	86,205	96,867	98,916
Imports	58,362	52,207	18,582	12,282	6,213
Consumption	1,161,858	1,204,035	1,149,177	1,247,515	1,131,297
Cyclohexane:					
Production	487,256	419,566	457,812	516,250	585,000
Exports	58,208	67,304	78,461	137,584	87,343
Imports	25,718	5,452	5,241	526	21,127
Consumption	454,766	357,714	384,592	379,192	518,784
All others:					
Production	4,225,376	4,320,826	4,328,869	5,303,220	5,231,380
Exports	115,524	124,540	124,667	159,389	159,972
Imports	159,857	146,601	137,568	161,754	127,927
Consumption	4,277,097	4,348,801	4,344,296	5,309,152	5,203,098
Total:					
Production	19,022,040	17,833,430	17,949,812	21,265,332	18,185,640
Exports	1,283,396	1,266,276	1,473,522	2,146,265	1,494,331
Imports	922,767	740,657	777,781	1,200,671	1,020,782
Consumption	18,661,411	17,307,811	17,254,071	20,319,738	17,712,091

[1] FAS value.
[2] Customs value.
Source: Based on official statistics from the U.S. Department of Commerce, American Chemistry Council, National Petrochemical & Refiners Association, and U.S. International Trade Commission staff estimates.

upstream cumene, weak demand, and increased global capacity in 1999 and 2000.[38] Although demand for nylon fibers has decreased, demand for nylon resins has increased, creating a balanced market for cyclohexane.[39]

Worker productivity levels for the organic chemicals industry varied over the 5-year period (table 4). Using a base level of 100 in 1992, productivity ranged a low of 104.4 in 1998 to a high of 120.1 in 2000 before declining to 106.4 in 2001. The decrease from 2000 to 2001 resulted primarily from a 14.5-percent decrease in production, despite only a 2.5-percent reduction in production employment levels.[40]

The basic feedstocks and energy source for production of the organic commodity chemicals include naphtha and natural gas. Whereas natural gas historically has been the lower priced feedstock for domestic industries, with supplies readily available, many foreign producers rely on naphtha, or crude petroleum, as a feedstock. For example, 70 percent of domestic ethylene producers have the ability to use natural gas; in comparison, 70 percent of foreign producers utilize naphtha.[41] Although prices for both are variable, industry sources state that natural gas historically has been a relatively less expensive domestic feedstock, allowing U.S. producers a competitive advantage in world markets.[42] However, since 1997, the relative price of natural gas has increased compared to that of crude petroleum (table 5). Higher natural gas feedstock prices reportedly have made the domestic gulf coast-based producers less competitive than producers that use naphtha.[43] In addition, the economic downturn in many of the world markets has reduced, or at least slowed, the growth rate of global demand for organic commodity chemicals. Because of high feedstock costs, slowing demand, and overseas competition, domestic producers have faced a challenging environment in recent years.[44]

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[38] John Hoffman, "Phenol and Acetone Under Pressure," *Chemical Market Reporter,* Feb. 19, 2001, p. 3.

[39] "Cyclohexane," *Chemical Market Reporter,* May 28, 2001, p. 27.

[40] William J. Storck, "Productivity Boost For Chemical Firms," *Chemical & Engineering News,* Mar. 18, 2002, p. 16.

[41] "US Chemical Industry Outlook: Trade and Domestic Demand," p. 33.

[42] Ibid.

[43] Ibid.

[44] John Hoffman, "U.S. Petrochemical Industry Continues to Face Structural Challenges," *Chemical Market Reporter*, Aug. 13, 2001, p. 22; and T. Kevin Swift and Martha Moore, "US Chemical Industry Outlook: Trade and Domestic Demand," p. 33.

Table 4
Organic commodity chemicals: productivity and unit labor costs, 1997-2001
(1992=100)

Item	1997	1998	1999	2000	2001
All manufacturing:					
Productivity	121.8	129.5	137.1	145.4	150.3
Unit labor costs	94.3	90.9	88.4	86.3	86.1
Organic chemicals:					
Productivity	113.1	104.4	114.6	120.1	106.4
Unit labor costs	101.6	113.6	105.2	105.0	119.1

Source: "Productivity Boost For Chemical Firms," *Chemical & Engineering News*, Mar. 18, 2002.

Table 5
Relative price history of crude petroleum and natural gas, 1987-2001

	Average for 1987-1996	1997	1998	1999	2000	2001
Crude petroleum annual average price[1]	15.69	17.23	10.87	15.56	26.72	22.35
Natural gas annual average price [2]	1.77	2.32	1.96	2.19	3.68	4.27
Ratio of crude petroleum price to natural gas price	8.9	7.4	5.5	7.1	7.3	5.2

[1] Price is in dollars per barrel, domestic first purchase price.

[2] Price is dollars per thousand cubic feet, wellhead price.

Source: Energy Information Administration, Monthly Energy Review.

U.S. TRADE

Overview

Trade in organic commodity chemicals is intrinsic in today's global marketplace. Because these chemicals are usually transported by ship, proximity to a deep water port is said to be a major determinant in the ability of producers in a given region to compete. For example, the United States ships most imports and exports through Houston, while northern Europe primarily uses Rotterdam and Antwerp.[45] From these and other ports worldwide, truck and rail are used to transport product to and from manufacturing plants.

[45] Patricia Short, "Europe's Nexus," *Chemical & Engineering News*, May 28, 2001, p. 18.

The domestic organic commodity chemicals industry maintained a positive net trade balance throughout the period 1997-2001, increasing from $361 million in 1997 to $946 million in 2000, before declining to $474 million in 2001. A significant part of this variation reflects the trade balance in styrene. The styrene trade balance increased from $218 million in 1997 to $440 million in 2000, only to decrease to a negative trade balance of $34 million in 2001. Although the styrene market averaged 4 percent annual growth through 1999, industry sources estimated a 10-percent decline in demand in 2001.[46] Polystyrene demand, which accounts for two-thirds of styrene demand, slowed in the second half of 2000 to match the slowdown in the domestic economy.[47] Some analysts suggest, however, that styrene demand in 2000 was artificially high, and demand in 2001 was artificially low because of buildups in inventory in 2000 and subsequent depletions in 2001.[48] Table 6 shows the trade balance for several major commodity chemicals.

Table 6
Trade balance of certain commodity chemicals, 1997-2001
(1,000 dollars)

Item	1997	1998	1999	2000	2001
para-Xylene	100,050	105,203	130,228	209,354	197,904
Phenol (hydroxybenzene)	5,588	12,364	4,057	111,611	145,884
Terephthalic acid and its salts	192,805	190,681	134,307	69,947	124,242
6-Hexanelactam (epsilon-caprolactam)	60,640	55,963	67,623	84,584	92,705
Cyclohexane	32,489	61,852	73,221	137,056	66,216
Aniline and its salts	(11,027)	(516)	3,346	13,056	12,310
meta-Xylene	(7,168)	20,303	16,915	18,120	10,908
Phthalic anhydride	5,568	3,766	6,619	6,867	7,803
Dicyclopentadiene and other cyclanes, cyclenes, and cycloterpenes	11,506	(3,934)	(17,976)	(4,840)	6,545
Cyclohexanol, methylcyclo-hexanols and dimethylcyclo-hexanols	(8,415)	(4,988)	(4,451)	(968)	700
Dodecylbenzene	(737)	(2,649)	(3,053)	(3,133)	(3,669)
Dimethyl terephthalate	3,102	3,541	918	835	(3,722)
ortho-Xylene	(31,940)	(37,899)	(35,245)	(26,300)	(13,445)
Ethylbenzene	30,457	18,959	5,508	18,650	(15,373)
Styrene	217,611	215,941	396,716	440,034	(33,701)

Source: Compiled from official statistics of the U.S. Department of Commerce.

[46] John Hoffman, "Styrene Demand and Prices Remain Weak," *Chemical Market Reporter,* Sept. 10, 2001, p. 1.
[47] Ibid.
[48] "CMAI Publishes Results of 2002 World Styrene Analysis," *PRNewswire*, Dec. 28, 2001.

U.S. Imports

Principal Suppliers and Import Levels

U.S. imports of organic commodity chemicals increased irregularly during 1997-2001, from $923 million in 1997 to $1.2 billion in 2000, before declining to $1.0 billion in 2001. The principal organic commodity chemicals imported into the United States during this period, based on value, were styrene, cumene, and *para*-xylene. Together, these three products accounted for 72 percent of the imported organic commodity chemicals during 1997-2001.

Styrene imports account for a significant portion of the fluctuation in the overall import levels of the organic commodity chemicals. Styrene imports grew from $173 million in 1997 to $482 million in 2000 before declining to $467 million in 2001. Cumene mirrored the overall import level fluctuations, increasing irregularly from $188 million in 1997 to $266 million in 2000, before declining to $201 million in 2001. Phenol production, which accounts for 95 percent of cumene demand, experienced a significant decline in demand in 2001.[49]

The primary suppliers of U.S. organic commodity chemical imports were Canada, Venezuela, Saudi Arabia and Nigeria, all countries with domestic reserves of crude petroleum. Canada exported $514 million of these goods in 2001 to the United States, $462 million of which was styrene. Venezuela exported $83 million, including $47 million in cumene and $21 million in *para*-xylene. Saudi Arabia exported $81 million, $40 million of which was *para*-xylene. Nigeria exported $21 million in 2001, $13 million of which was cumene.[50] Combined, these four countries contributed a minimum of 51 percent of U.S. imports of these products in 1997 to a maximum of 70 percent of imports in 2000. See table B-1 for a list of imports by country.

Tariff and Nontariff Measures

Table 7 shows the tariff rates of duty as of January 1, 2002, for imports of the organic commodity chemicals under the Harmonized Tariff Schedule (HTS) of the United States. The United States currently has zero tariffs on eight of the organic commodity chemicals imported from countries with normal trade relations status; these eight products accounted for 87 percent of imports of organic commodity chemicals in 2001**.** Eligible imports from Canada, which accounted for 50 percent of organic commodity chemical imports in 2001, enter the United States duty free under the North American Free Trade Agreement (NAFTA). Eligible goods from Venezuela and Nigeria, accounting for 8.1 percent and 2.1 percent respectively of 2001 U.S. imports of these products, enter duty free under the Generalized System of Preferences. Saudi Arabia supplied 7.9 percent of U.S. imports of

[49] "Cumene," *Chemical Week,* Mar. 20, 2002, p. 47.
[50] Nigerian exports from 1997 through 2000 ranged from $65 million to $127 million.

Table 7
Organic commodity chemicals: Harmonized Tariff Schedule subheading; description; U.S. column 1, Special, and column 2 rates of duty as of Jan. 1, 2002; U.S. imports, 2001; and U.S. exports, 2001

HTS	Description	Column 1 rate of duty as of Jan. 1, 2002– General	AVE for Compound Rates	Special	Column 2 rate of duty as of Jan. 1, 2002–	U.S. imports, 2001	U.S. exports, 2001
						1,000 dollars	
2902.11.00	Cyclohexane	0.4¢/kg + 2.5%	3.48%	Free (A*, CA, E, IL, J, MX)	15.4¢/kg + 40%	21,127	87,343
2902.19.00	Cyclanic hydrocarbons (except cyclohexane), cyclenic hydrocarbons and cycloterpenes	Free			25%	27,458	34,003
2902.41.00	*o*-Xylene	Free			Free	37,348	23,903
2902.42.00	*m*-Xylene	Free			Free	3,808	14,716
2902.43.00	*p*-Xylene	Free			Free	145,759	343,663
2902.50.00	Styrene	Free			15.4¢/kg + 45%	466,678	432,977
2902.60.00	Ethylbenzene	0.2¢/kg +3.5%	3.89%	Free (A*, CA, E, IL, J) 0.1¢/kg +1.7% (MX)	15.4¢/kg + 55%	19,129	3,756
2902.70.00	Cumene	Free			Free	201,184	68,371
2902.90.10	Pseudocumene	Free			Free	2,867	([1])
2902.90.20	Acenaphthene, chrysene, cymene, dimethylnaphthalenes, fluoranthene, fluorene, indene, mesitylene, and other specified cyclic hydrocarbons	Free			Free	7,173	([1])
2902.90.30	Alkylbenzenes and polyalkylbenzenes	0.2¢/kg + 3.5%	3.78%	Free (A+, CA, D, E, IL, J) 0.1¢/kg +1.7% (MX)	15.4¢/kg + 55%	4,156	34,691
2902.90.40	Anthracene and 1,4-di-(2-methylstyryl)benzene	2.1%		Free (A*, CA, E, IL, J) 1% (MX)	15.4¢/kg + 68.5%	26	([1])
2902.90.60	Biphenyl (diphenyl), in flakes	2.1%		Free (A*, CA, E, IL, J)	15.4¢/kg + 68.5%	169	([1])
2902.90.90	Cyclic hydrocarbons, nesoi	2.1%		Free (A+, CA, D, E, IL, J, K) 1% (MX)	15.4¢/kg + 68.5%	29,341	([1])

See footnote at end of table.

Table 7–*Continued*
Organic commodity chemicals: Harmonized Tariff Schedule subheading; description; U.S. column 1, Special, and column 2 rates of duty as of Jan. 1, 2002; U.S. imports, 2001; and U.S. exports, 2001

HTS	Description	Column 1 rate of duty as of Jan. 1, 2002– General	AVE for Compound Rates	Special	Column 2	U.S. imports, 2001	U.S. exports, 2001
						1,000 dollars	
2906.12.00	Cyclohexanol, methylcyclohexanols and dimethylcyclohexanols-	0.7¢/kg + 7.8%	7.80%	Free (A+, CA, D, E, IL, J, MX) 0.9¢/kg + 6% (JO)	15.4¢/kg + 53.5%	19	719
2907.11.00	Phenol (hydroxybenzene) and its salts	5.5%		Free (A*, CA, E, IL, J, MX) 2.7% (JO)	15.4¢/kg + 44%	7,793	153,677
2917.35.00	Phthalic anhydride	0.5¢/kg + 6.9%	7.76%	Free (A*, CA, E, IL, J, K, MX) 0.5¢/kg + 3.6% (JO)	15.4¢/kg + 49%	7,353	15,156
2917.36.00	Terephthalic acid and its salts	0.7¢/kg + 8.8%	16.24%	Free (A+, CA, D, E, IL, J) 0.3¢/kg +1.7% (MX) 0.5¢/kg + 3.6% (JO)	15.4¢/kg + 57%	4,019	128,261
2917.37.00	Dimethyl terephthalate	0.6¢/kg + 7.8%	7.99%	Free (A*, CA, E, IL, J, MX) 0.7¢/kg +5.4% (JO)	15.4¢/kg + 42%	5,672	1,950
2921.41.10	Aniline	0.7¢/kg + 7.9%	9.37%	Free (A+, CA, D, E, IL, J) 0.3¢/kg +1.3% (MX) 0.9¢/kg + 5.5% (JO)	15.4¢/kg + 43.5%	2,516	([1])
2921.41.20	Aniline salts	0.5¢/kg + 9%	9.04%	Free (A+, CA, D, E, IL, J) 0.2¢/kg +1.8% (MX) 0.6¢/kg + 6.8% (JO)	15.4¢/kg + 60%	14	([1])
2933.71.00	6-Hexanelactam (epsilon-caprolactam)	0.7¢/kg + 7.2%	7.83%	Free (A*, CA, E, IL, J, MX) 0.6¢/kg +3.9% (JO)	15.4¢/kg + 40%	6,212	98,917

[1] Official statistics for U.S. exports of the products classified under this HTS subheading are not collected at a similar level of aggregation.

Programs under which special tariff treatment may be provided and the corresponding symbols for such programs as they are indicated in the “Special” subcolumn are as follows: Generalized System of Preferences (A or A*); North American Free Trade Agreement, eligible goods of Canada (CA); African Growth and Opportunity Act (D); Caribbean Basin Economic Recovery Act (E); United States-Israel Free Trade Agreement (IL); the Andean Trade Preference Act (J); United States-Jordan Free Trade Area Implementation Act (JO); Agreement on Trade in Pharmaceutical Products (K); and the North American Free Trade Agreement, eligible goods of Mexico (MX).

Source: Harmonized Tariff Schedule of the United States. U.S. import and export data compiled from official statistics of the U.S. Department of Commerce.

these products in 2001, although products with zero tariffs accounted for 97 percent of these imports, including *para*-xylene, cumene, and styrene. No nontariff measures restricting imports have been reported to Commission staff.

U.S. Government Trade-Related Investigations

During the period 1997 through 2001, there were no trade investigations conducted by the Commission on any of the organic commodity chemicals addressed in this report.

U.S. Exports

Because of the establishment of specific grade and purity levels, the organic commodity chemicals are of uniform quality and move in a global market. As a result, export levels can fluctuate because of a variety of factors, including the choice of feedstock and currency valuations. As previously mentioned, because U.S. producers can avail themselves of lower cost natural gas, U.S. commodity chemicals often are priced competitively, making them attractive internationally. However, because of the relatively strong valuation of the U.S. dollar in recent years, domestic producers reportedly have found it more difficult to export goods in a profitable manner.[51]

[51] Based on Commission telephone conversations with industry sources.

Principal Markets and Export Levels

Total U.S. exports of organic commodity chemicals increased from $1.28 billion in 1997 to a high of $2.15 billion in 2000 and then decreased to $1.49 billion in 2001. The four largest U.S. export markets for these products in 2001 were Mexico (35 percent of exports), Canada (21 percent), Taiwan (9 percent), and the Netherlands (6 percent). From 1997 through 2001, these four countries accounted for 63 to 70 percent of U.S. exports of organic commodity chemicals. The two largest organic commodity chemical exports were styrene and *para*-xylene, which together accounted for 55 percent of all exports of commodity chemicals in the period 1997-2001.

Mexico accounted for 42 percent of U.S. styrene exports in 2001. Although the country possesses indigenous stores of crude petroleum, the Mexican Government has recognized the need to increase efficiency and productivity within Petroleos Mexicanos (Pemex), the state-owned crude petroleum producer.[51] For example, Pemex Petroquimica president Rafael Beverido Lomelin cited the need to improve Pemex's cost structure in order to reduce Mexico's dependency on chemical imports.[52]

Asia has also been a large market for U.S. exports of these products. For example, strong polyester demand in Asia contributed to U.S. *para*-xylene exports to this region in the past. Increased Asian production capacity and decreasing global polyester demand, however, may affect the future trade balance of this chemical.[53] See table B-2 for a list of exports by country.

Foreign Trade Measures

In general, duty rates on the organic commodity chemicals worldwide are low or free. Under NAFTA, qualifying U.S. exports enter Canada and Mexico free of duty. The European Union (EU) has no tariffs for cyclohexane, styrene, xylene isomers, cumene, or ethylbenzene. The remainder of the organic commodity chemicals entering the EU are dutiable at rates ranging from 3.0 to 8.5 percent. Japan's duty rates for the major organic commodity chemicals for World Trade Organization (WTO) members range from free to 5.3 percent. In 2001, China maintained rates of 6 to 14 percent for their "normal trade relations" partners, and rates of 20 to 30 percent for other countries. However, the Chinese Government, under its WTO accession agreement, has committed to lowering chemical tariffs to 6.9 percent by 2004.[54] Taiwan currently imposes tariff rates of 5 percent or less on most organic commodity imports.

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[51] Simon Webb, "Pemex Shake-up," *Business Mexico,* Apr. 2001, p. 26.

[52] Robert Westervelt and Kara Sissel, "Pemex to Invest $1 Billion in Petchems," *Chemical Week,* Apr. 3, 2002, p. 9.

[53] Malini Hariharan, "Looking Up," *Chemical Market Reporter,* May 22, 2000, p. 45.

[54] Ibid.

In the Uruguay Round of trade negotiations, the Chemical Tariff Harmonization Agreement (CTHA) was developed, which would reduce maximum chemical tariffs to levels between 5.5 and 6.5 percent.[55] North America, Europe and Japan have committed to eliminating chemical tariffs by 2010, but with the condition that all other WTO members make similar commitments, even if such a commitment is phased in over a longer period of time.[56] Countries that have not agreed to the CTHA account for approximately 30 percent of worldwide chemical production, including Argentina, Brazil, Malaysia, and Venezuela. These countries appear to want similar agreements in textiles and agriculture before agreeing to the chemicals proposal.[57]

FOREIGN INDUSTRY PROFILE

Major producers of the organic commodity chemicals typically are located either near large sources of crude petroleum or near major markets of industrialized and rapidly industrializing nations. As a result, the dominant countries in this market are in North America, western Europe, and the Asian rim. The members of the Organization of Petroleum Exporting Countries (OPEC) are also major producers.

North America

The Canadian organic chemicals industry depends on large petroleum reserves in Alberta and Saskatchewan and is an export-oriented industry. The Canadian Chemical Producers Association reported that 55 percent of chemical gross output was exported in 1998.[58] A new set of production facilities in 2000 was designed for 80 percent of the output to be exported, primarily to the United States and Southeast Asia. The organic commodity chemicals trade deficit with Canada was $20.7 million in 1997 and $201 million in 2001.[59] U.S. styrene imports from Canada ranged from $170 million in 1997 to $223 million in 1999. However, these imports increased to $449 million in 2000 and $462 million in 2001. This increase is a result of both increased volume and higher unit values.[60] Canadian ethane feedstock costs rose in 1999 and 2000, but this increase was less than the increase of U.S. gulf coast ethane, increasing the Canadian producers' competitiveness versus that of the U.S. producers.[61]

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[55] Neil Franz, "Huge Chemical Markets Hinge on WTO Decisions," *Chemical Week*, Dec. 1, 1999, p. 50.

[56] Sean Milmo, "European Chem Industry Is Wary of Trade Talks," *Chemical Market Reporter*, Nov. 29, 1999, p. 6.

[57] Ibid.

[58] Canadian Chemical Producers Association, "Think Investment - Chemicals," Oct. 29, 1999.

[59] Trade balances are based on official statistics of the U.S. Department of Commerce for the HTS numbers at the six-digit level of the chemicals covered in this report. Imports are imports for consumption value and exports are domestic exports FAS value.

[60] Based on official statistics of the U.S. Department of Commerce, U.S. imports from Canada averaged 276 million kilograms of styrene in 1997-1998 and 505 million kilograms between 1999-2001. The customs unit value per first unit of quantity averaged $0.527 per kilogram in 1997-1998 and $0.748 between 1999-2001.

[61] Peter Fairley, "Canadian Chemicals: Running on Empty," *Chemical Week,* July 19, 2000, p. 20.

Between 1997 and 2001, the trade surplus in organic commodity chemicals with Mexico increased 214 percent from $159 million to $499 million. A significant portion of this increase resulted from increased exports of *para*-xylene (from $113 million in 1997 to $252 million in 2001) and styrene ($78 million in 1997 to $182 million in 2002). Despite ample crude petroleum resources, Mexican petrochemical production has declined in recent years and Mexico faces the possibility of becoming a net importer of these goods in the near future.[62] The dominant producer in this market is Pemex, a national petroleum monopoly, which varies between the third- and fifth-largest petroleum producer globally, depending on output fluctuations. According to industry sources, Mexico's President, Vicente Fox, has made it clear that there are no plans currently in place to privatize Pemex,[63] but he wishes to improve the company's competitiveness.[64] These sources report that this will necessitate increasing the company's efficiency and productivity through various means, including fiscal reform.[65] Currently, for example, profits are returned to Mexico's Government, and reinvestment capital is distributed in annual budgets by the Mexican Government, reportedly resulting in little incentive for the company to operate in an efficient and profitable manner.[66]

Asia

Asian Pacific countries currently account for one-third of global chemical consumption, but industry sources predict this level will increase to one-half in the future.[67] Capacity increases coming onstream between 1998 and 2010, however, may satisfy some of the increased demand in the region. Multi-national corporations, including Shell, BP, BASF, and Dow, have invested in petrochemical projects in this region.[68]

With China's entrance into the WTO in November 2001, the increased availability of Chinese markets has major producers worldwide expressing interest.[69] The planned removal of reported *de facto* trade barriers, including restrictions on import, resale, and distribution by existing foreign ventures, and the lowering of import tariffs are designed to open markets to foreign producers.[70] Chemical Market Associates, Inc., (CMAI) estimates that China's share of the world styrene market by weight grew from 2 percent in 1994-1995 to approximately 8 percent in 1999-2000.[71] In 2001, China's styrene demand continued to grow, increasing 22 percent (by weight), despite a decline in world styrene demand of 2.6 percent.[72] The country is expected to account for 11 percent of the world's styrene consumption by weight in 2003, exceeding Asian production capacity by 1.2 million tons ($612 million based on 5-year average domestic price).[73]

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[62] "Pemex Teeters on the Edge," *Chemical Market Reporter*, Mar. 25, 2002, p. N27.
[63] Ibid.
[64] Webb,"Pemex Shake-up," p.26.
[65] Ibid; "Pemex Teeters on the Edge," p. N27.
[66] Webb, "Pemex Shake-up," p. 26.
[67] Natasha Alperowicz, "Asia Still Offers the Most Growth," *Chemical Week*, Mar. 20, 2002, p. 34.
[68] Eleanor Van Savage, "Asia Petrochemical Industry Faces Challenges in 2001 and Beyond," *Chemical Market Reporter,* Jan. 1, 2001, p. 4.
[69] Sigmund Floyd, "Cracking the Chemical Sector," *China Business Review,* Mar./Apr. 2002, p. 32.
[70] Ibid.
[71] Malini Hariharan, "Pull and Push of the West," *Chemical Market Reporter*, May 28, 2001, p. S54.
[72] "Styrene Industry to Recover After Dismal 2001," *Oil & Gas Journal*, Feb. 4, 2002, p. 52. As noted in the article, however, some of this growth may have been a result of improved record-keeping of imports and improved antismuggling efforts, rather than actual increase in demand.
[73] Ibid.

With China's average tariffs on chemical imports dropping from 14.7 percent to 6.9 percent, imports of $30.2 billion in chemicals in 2000,[74] and a predicted GNP growth rate of 7.6 percent in 2002,[75] organic commodity chemicals producers worldwide are reportedly examining the Chinese market closely for opportunities. One estimate by the American Chemical Council shows an increase in U.S. exports to China of more than $300 million in the initial years following China's accession to the WTO.[76] The U.S. organic commodity chemicals trade balance with China has irregularly increased from $7.9 million in 1997 to $11.5 million in 2001.

Taiwan has built several organic commodity chemicals production facilities in recent years. As these plants have come online, U.S. exports of these goods to Taiwan have decreased. In 1999, U.S. exports of organic commodity chemicals to Taiwan were $239 million, 16 percent of total U.S. exports of these goods. In 2001, exports were $135 million, accounting for 9 percent of exports. In 2000, Formosa Chemicals and Fibre Corporation began production in a new aromatics plant capable of annual output of 450,000 metric tons of *para*-xylene, 100,000 metric tons of *ortho*-xylene, 200,000 metric tons of phenol, and 250,000 tons of styrene.[77] Taiwan was accepted into the WTO in 2001 with China, but industry sources do not predict major changes from Taiwan's entry. A decline of 2.5 percent in Taiwan's GDP in 2001[78] may have slowed the domestic demand for the organic commodity chemicals as well. The U.S. trade balance with Taiwan was $183 million in 1997 and $134 million in 2001.

According to industry sources, Singapore has attracted significant foreign investment because of its stable government and probusiness environment, despite a lack of domestic feedstocks.[79] Without a substantial home market, however, production is largely export-dominated and is dictated primarily by world demand for these goods.[80] The U.S. trade balance with Singapore for these products increased irregularly from $94 thousand in 1997 to $10 million in 2000, before declining to $2.7 million in 2001.

Japan has reportedly never concentrated on an export market, using only marginal tonnage for exports.[81] However, because of stagnant growth domestically, Japanese producers are said to be exploring export opportunities, especially to China and other Asian countries.[82] The U.S. trade deficit with Japan in these products declined from $58.4 million in 1997 to $17.7 million in 2001.

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[74] Ian Young, "China Launches Probe Into Alleged Caprolactam Dumping," *Chemical Week,* Dec. 19-26, 2001, p. 16.

[75] John Richardson, "Some Spots Brighten Up for Asian Petrochemicals," *Chemical Market Reporter,* Jan. 21, 2002, p. 9.

[76] Andrew Wood, "Free Trade Secrets," *Chemical Week*, Aug. 23, 2000, p. 3.

[77] Malini Hariharan, "Crossroads," *Chemical Market Reporter*, May 28, 2001, p. S48.

[78] Richardson, "Some Spots Brighten Up For Asian Petrochemicals," p. 9.

[79] Stephen Moore, "Fighting the Tide: a Big Buildup in Singapore," *Chemical Week,* Feb. 6, 2002, p. 21.

[80] Ibid.

[81] "Annus Horribilis," *Chemical Market Reporter*, Mar. 25, 2002, p. N29.

[82] "Japanese Chemical Industry Turning to China Market," *Asiainfo Daily China News,* Mar. 19, 2002.

Europe

The European petrochemical industry has recently faced poor margins, excess capacity, and weak demand growth.[83] In addition, according to a CMAI analyst, current investment levels in the Middle East petrochemicals industry are "a major factor stopping anyone putting any money on the table for European expansions at the moment."[84] With an estimated 7 million metric tons per year of ethylene production coming on stream between 2005 and 2010 in the Middle East, industry sources state that it is likely that substantial amounts of this output will be exported to Europe.[85]

The two major determinants in plant location are access to feedstocks and proximity to growth markets. The European market for organic commodity chemicals is extremely competitive, with very low margins. As a result, there are very few new facilities being constructed in the area beyond 2004.[86] European producers, including BP, Shell, and TotalFinaElf, are entering into strategic alliances in the Middle East, especially Saudi Arabia and Iran, rather than building new facilities in Europe.[87] Industry sources predict continued restructuring and rationalization in European production, supported by indications from producers DSM and Eni that they are looking to divest their European petrochemicals activities.[88]

The European transportation infrastructure has been described as operating with less-than-optimal efficiency.[89] For example, the rail infrastructure, built prior to European unification, contains 15 different nationalized railroads. The majority of European chemical shipments travel by road (88 percent); the remainder are shipped by waterway (4 percent) and by rail (7 percent). In contrast, 56 percent of U.S. shipments travel by road, 15 percent by waterway, and 29 percent by rail.[90] The European Chemical Industry Council is seeking to increase transportation efficiency by increasing use of rail and waterways.[91]

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[83] "European Petrochemicals Industry Appears in Need of Further Rationalization," *Chemical Market Reporter,* Feb. 25, 2002, p. 9.
[84] Ibid.
[85] "Europeans Question Impact of Major Petrochem Expansions in Middle East," *Chemical Market Reporter,* June 18, 2001, p. 6.
[86] "Facing Competition," *Chemical Market Reporter*, Mar. 25, 2002, p. N33.
[87] "Europeans Question Impact of Major Petrochem Expansions in Middle East," p. 6.
[88] "Facing Competition," *Chemical Market Reporter*, Mar. 25, 2002, p. N33.
[89] Mike Corkhill, "Moving More Efficiently," *Chemical Week*, Sept. 29, 1999, p. S56.
[90] Ibid.
[91] Ibid.

Middle East

The Middle Eastern members of OPEC include Iran, Iraq, Kuwait, Saudi Arabia, the United Arab Emirates, and Qatar. Each of these countries possesses significant crude petroleum reserves. As a result, it is economically advantageous to base production of the organic commodity chemicals near these reserves. Proximity minimizes transportation costs and delays and permits vertical integration and reliable access to feedstocks. This area received large influxes of capital investment recently by foreign multinationals such as BP, ExxonMobil, and Shell, especially during the period 2000-2001.[92] These new facilities, in addition to new production facilities in the Asia/Pacific area, have contributed to significant increases in worldwide capacity.

Others

According to industry sources, Russia has the potential to become an important factor in the international chemicals marketplace.[93] This region has only recently raised production levels back to the levels of the 1980s.[94] However, Russia possesses lower cost and reliable feedstocks and generally incurs lower labor costs, which, under certain circumstances, are said to be as low as 10 percent of labor costs in Western Europe.[95] Industry sources state that the two largest Russian petroleum and natural gas producers, Lukoil and Gazprom, have begun integration efforts from crude petroleum exploration to aromatics production.[96] With strict government controls on energy prices, these firms have turned to the manufacture and processing of downstream products in order to maximize profits.[97] Gazprom currently owns a 51-percent interest in the Siberian-Ural Petrochemical and Gas Company (Sibur), the largest petrochemical group in Russia.[98] Although its plants are based primarily on technology from the 1970s and 1980s, Sibur is negotiating a joint venture with BASF and plans an initial public offering on the New York Stock exchange in 2004.[99] According to company president Yakov Goldovskii, Sibur aims to become a leading petrochemicals player in Central and Eastern Europe, with eventual plans of expanding into Asia.[100]

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[92] Ibid.

[93] Sean Milmo, "Russia Emerges as a Potential Power in European Chemicals," *Chemical Market Reporter,* Mar. 26, 2001, p. FR6.

[94] Ibid.

[95] Ibid.

[96] Ibid.

[97] Ibid.

[98] Natasha Alperowicz, "Sibur: A New Power in the East," *Chemical Week,* Aug. 1, 2001, p. 45.

[99] Ibid.

[100] Ibid.

APPENDIX A
EXPLANATION OF TARIFF AND TRADE AGREEMENT TERMS

APPENDIX A
TARIFF AND TRADE AGREEMENT TERMS

In the ***Harmonized Tariff Schedule of the United States*** (HTS), chapters 1through 97 cover all goods in trade and incorporate in the tariff nomenclature the internationally adopted Harmonized Commodity Description and Coding System through the 6-digit level of product description. Subordinate 8-digit product subdivisions, either enacted by Congress or proclaimed by the President, allow more narrowly applicable duty rates; 10-digit administrative statistical reporting numbers provide data of national interest. Chapters 98 and 99 contain special U.S. classifications and temporary rate provisions, respectively. The HTS replaced the *Tariff Schedules of the United States* (TSUS) effective January 1, 1989.

Duty rates in the ***general*** subcolumn of HTS column 1 are normal trade relations rates; many general rates have been eliminated or are being reduced due to concessions resulting from the Uruguay Round of Multilateral Trade Negotiations. Column 1-general duty rates apply to all countries except those listed in HTS general note 3(b) (Cuba, Laos, and North Korea) plus Serbia and Montenegro, which are subject to the statutory rates set forth in ***column 2***. Specified goods from designated general-rate countries may be eligible for reduced rates of duty or duty-free entry under preferential tariff programs, as set forth in the ***special*** subcolumn of HTS rate of duty column 1 or in the general notes. If eligibility for special tariff rates is not claimed or established, goods are dutiable at column 1-general rates. The HTS does not list countries covered by a total or partial embargo.

The ***Generalized System of Preferences*** (GSP) affords nonreciprocal tariff preferences to designated beneficiary developing countries. The U.S. GSP, enacted in title V of the Trade Act of 1974 for 10 years and extended several times thereafter, applies to merchandise imported on or after January 1, 1976, and before the close of December 31, 2006. Indicated by the symbol "A", "A*", or "A+" in the special subcolumn, GSP provides duty-free entry to eligible articles the product of and imported directly from designated beneficiary developing countries (see HTS gen. note 4). Eligible products of listed sub-Saharan African countries may qualify for duty-free entry under the ***African Growth and Opportunity Act*** (AGOA) (see HTS gen. note 16) through September 30, 2008, as indicated by the symbol “D” in the special subcolumn; see subchapter XIX of chapter 98.

The ***Caribbean Basin Economic Recovery Act*** (CBERA) affords nonreciprocal tariff preferences to designated Caribbean Basin developing countries. The CBERA, enacted in title II of Public Law 98-67, implemented by Presidential Proclamation 5133 of November 30, 1983, and amended by the Customs and Trade Act of 1990, applies to goods entered, or withdrawn from warehouse for consumption, on or after January 1, 1984. Indicated by the symbol "E" or "E*" in the special subcolumn, CBERA provides duty-free entry to eligible articles, and reduced-duty treatment to certain other articles, which are the product of and imported directly from designated countries (see HTS gen. note 7). Eligible products of listed beneficiary countries may qualify for duty-free or reduced-duty entry under the

Caribbean Basin Trade Partnership Act (CBTPA) (see HTS gen. note 17), through September 30, 2008, as indicated by the symbol "R" in the special subcolumn; see subchapter XX of chapter 98.

Free rates of duty in the special subcolumn followed by the symbol "IL" are applicable to products of Israel under the ***United States-Israel Free Trade Area Implementation Act*** of 1985 (IFTA), as provided in general note 8 to the HTS; see also subchapter VIII of chapter 99.

Preferential nonreciprocal duty-free treatment in the special subcolumn followed by the symbol "J" or "J*" in parentheses is afforded to eligible articles from designated beneficiary countries under the ***Andean Trade Preference Act*** (ATPA), enacted as title II of Public Law 102-182 (effective July 22, 1992; see HTS gen. note 11) and renewed through December 31, 2006, by the ***Andean Trade Promotion and Drug Eradication Act*** of 2002.

Preferential free rates of duty in the special subcolumn followed by the symbol "CA" are applicable to eligible goods of Canada, and rates followed by the symbol "MX" are applicable to eligible goods of Mexico, under the ***North American Free Trade Agreement*** (NAFTA), as provided in general note 12 to the HTS and implemented effective January 1, 1994, by Presidential Proclamation 6641 of December 15, 1993. Goods must originate in the NAFTA region under rules set forth in general note 12(t) and meet other requirements of the note and applicable regulations.

Preferential rates of duty in the special subcolumn followed by the symbol "JO" are applicable to eligible goods of Jordan under the ***United States-Jordan Free Trade Area Implementation Act***, (JFTA) effective as of Dec. 17, 2001; see HTS gen. note 18 and subchapter IX of chapter 99.

Other special tariff treatment applies to particular ***products of insular possessions*** (gen. note 3(a)(iv)), ***products of the West Bank and Gaza Strip*** (gen. note 3(a)(v)), goods covered by the ***Automotive Products Trade Act*** (APTA) (gen. note 5) and the ***Agreement on Trade in Civil Aircraft*** (ATCA) (gen. note 6), ***articles imported from freely associated states*** (gen. note 10), ***pharmaceutical products*** (gen. note 13), and ***intermediate chemicals for dyes*** (gen. note 14).

The ***General Agreement on Tariffs and Trade 1994*** (GATT 1994), pursuant to the Agreement Establishing the World Trade Organization, is based upon the earlier GATT 1947 (61 Stat. (pt. 5) A58; 8 UST (pt. 2) 1786) as the primary multilateral system of discipline and principles governing international trade. The agreements mandate most-favored-nation treatment, maintenance of scheduled concession rates of duty, and national treatment for imported goods; GATT provides the legal framework for customs valuation standards, "escape clause" (emergency) actions, antidumping and countervailing duties, dispute settlement, and other measures. Results of the Uruguay Round of multilateral tariff negotiations are set forth in separate schedules of concessions for each participating contracting party, with the U.S. schedule designated as Schedule XX. Pursuant to the **Agreement on Textiles and Clothing** (ATC) of the GATT 1994, member countries are phasing out restrictions on imports under the prior "Arrangement Regarding International Trade in Textiles" (known as the **Multifiber Arrangement** (MFA)). Under the MFA, a departure from GATT 1947 provisions, importing and exporting countries negotiated bilateral agreements limiting textile and apparel shipments, and importing countries could

take unilateral action to control shipments. Quantitative limits were established on textiles and apparel of cotton, other vegetable fibers, wool, man-made fibers or silk blends in an effort to prevent or limit market disruption in the importing countries. The ATC establishes notification and safeguard procedures, along with other rules concerning the customs treatment of textile and apparel shipments, and calls for the eventual complete integration of this sector into the GATT 1994 and the phase-out of quotas over a ten-year period, or by Jan. 1, 2005.

APPENDIX B
STATISTICAL TABLES

Table B-1
Organic commodity chemicals: U.S. imports for consumption, by principal sources, 1997-2001
(1,000 dollars)

Item/country	1997	1998	1999	2000	2001
Cyclohexane:					
Argentina	7,282	4,569	3,321	0	6,793
United Kingdom	0	0	0	0	6,688
Belgium	0	16	0	0	3,225
Saudi Arabia	0	0	0	0	2,357
Netherlands	0	14	891	0	1,669
Indonesia	0	0	0	0	265
All others	18,436	853	1,028	526	129
Total	25,718	5,452	5,241	526	21,127
Dicyclopentadiene:					
Japan	6,062	5,229	5,261	4,947	5,620
Canada	3,685	6,411	14,057	6,954	4,229
Brazil	710	1,256	2,155	2,325	3,513
Korea	0	138	390	406	236
Austria	0	29	18	34	54
Spain	0	0	5	0	49
All others	797	332	11	2	39
Total	11,254	13,394	21,898	14,669	13,740
Other cyclanes, cyclenes, and cycloterpenes:					
Japan	3,598	4,846	8,653	8,444	7,081
Brazil	592	799	974	621	1,270
Canada	126	80	1,500	4,189	1,260
Germany	573	794	1,459	1,589	1,155
Chile	903	585	711	445	712
Spain	447	437	641	666	506
All others	9,114	8,575	5,885	2,764	1,735
Total	15,353	16,116	19,823	18,719	13,720
ortho-Xylene:					
Venezuela	4,519	3,127	11,845	26,788	11,913
Canada	11,168	7,425	6,413	7,779	7,935
Iraq	0	2,495	7,005	2,611	5,211
Colombia	2,667	1,355	3,241	5,174	4,500
Saudi Arabia	9,137	11,820	6,058	619	2,380
Nigeria	8,655	8,742	3,967	12,695	2,318
All others	15,367	11,375	4,881	3,615	3,091
Total	51,513	46,339	43,409	59,282	37,349
meta-Xylene:					
Canada	79	104	75	484	3,808
Belgium	0	0	0	22	0
Colombia	0	0	0	1,016	0
Iraq	0	0	768	309	0
Korea	0	0	1,079	0	0
Netherlands	1	2	0	0	0
All others	7,163	12,296	5,256	3,466	0
Total	7,243	12,402	7,178	5,298	3,808

Table B-1–*Continued*
Organic commodity chemicals: U.S. imports for consumption, by principal sources, 1997-2001
(1,000 dollars)

Item/country	1997	1998	1999	2000	2001
para-Xylene:					
Saudi Arabia	28,155	21,201	9,174	41,135	40,325
Venezuela	12,074	6,719	17,000	48,051	21,281
India	0	0	0	0	19,841
Iraq	0	9,901	20,071	8,206	18,163
Colombia	10,298	7,850	22,618	38,012	12,964
Korea	0	0	0	1,112	8,546
All others	175,672	127,167	69,415	95,794	24,638
Total	226,199	172,838	138,277	232,310	145,758
Styrene:					
Canada	169,913	121,032	223,396	448,597	462,430
Saudi Arabia	0	0	0	0	4,134
Netherlands	0	0	3,986	468	45
India	0	0	0	0	28
Italy	58	44	0	0	18
Iraq	0	0	0	0	14
All others	3,456	14,052	3,795	33,158	10
Total	173,427	135,127	231,177	482,223	466,679
Ethylbenzene:					
Canada	826	255	35	97	16,108
Netherlands	0	0	0	0	3,016
Spain	0	0	0	0	5
Brazil	0	0	0	0	0
Germany	0	14	0	0	0
Saudi Arabia	0	0	14	0	0
All others	719	0	5	0	0
Total	1,545	269	54	97	19,129
Cumene:					
Venezuela	43,643	34,081	29,466	62,552	47,174
Norway	13,035	12,628	12,539	25,668	36,151
Saudi Arabia	24,146	22,536	22,019	35,952	31,483
Iraq	0	0	17,095	18,307	30,074
Colombia	6,086	7,976	12,034	21,662	27,261
Nigeria	26,106	32,479	46,486	68,735	13,339
All others	75,115	32,285	26,064	33,079	15,703
Total	188,130	141,985	165,704	265,954	201,185
Pseudocumene:					
Iraq	0	0	1,287	971	1,289
Colombia	507	579	156	1,233	799
Algeria	0	0	172	0	386
Nigeria	632	5,943	473	2,819	348
United Kingdom	536	643	334	700	31
China	0	0	209	688	14
All others	2,131	1,493	484	1,537	0
Total	3,806	8,658	3,114	7,948	2,868

Table B-1–*Continued*
Organic commodity chemicals: U.S. imports for consumption, by principal sources, 1997-2001
(1,000 dollars)

Item/country	1997	1998	1999	2000	2001
Acenaphthene, chrysene, cymene, dimethylnaphthalenes, fluoranthene, fluorene, indene, mesitylene, and other specified cyclic hydrocarbons:					
China	3	178	0	5	3,665
Germany	2,879	2,885	1,351	2,612	2,046
Italy	1,621	2,089	474	1,436	937
Japan	632	1,207	1,097	2,284	465
Ecuador	0	0	0	0	23
Austria	0	0	0	0	11
All others	204	323	237	55	27
Total	5,339	6,682	3,159	6,392	7,175
Dodecylbenzene:					
Japan	1,911	2,430	3,350	3,534	3,666
Venezuela	0	15	91	0	200
Canada	0	0	9	18	9
Belgium	0	0	0	3	8
China	0	0	0	2	7
France	308	104	0	0	0
All others	29	538	0	0	0
Total	2,248	3,087	3,449	3,556	3,891
Other alkyl and polyalkyl benzenes:					
Spain	0	0	0	0	124
Netherlands	0	112	194	0	76
Israel	0	0	11	25	25
United Kingdom	434	13	471	16	19
Switzerland	17	7	7	3	15
Japan	1,942	539	145	15	5
All others	10,946	2,855	941	995	2
Total	13,339	3,527	1,769	1,054	267
Anthracene and 1,4-di-(2-methylstyryl) benzene:					
Netherlands	0	0	13	20	14
China	0	0	4	3	6
India	0	0	0	0	3
Japan	0	0	0	0	3
Germany	56	12	12	5	0
Hungary	12	106	82	0	0
All others	0	0	0	0	0
Total	68	118	110	28	26
Biphenyl (diphenyl), in flakes:					
United Kingdom	23	92	71	104	138
Japan	19	43	53	20	17
Canada	0	0	20	2	12
Lithuania	0	0	0	0	2
Austria	8	0	0	0	0
Germany	0	6	0	0	0
All others	0	59	0	0	0
Total	50	199	144	126	170

Table B-1–*Continued*
Organic commodity chemicals: U.S. imports for consumption, by principal sources, 1997-2001
(1,000 dollars)

Item/country	1997	1998	1999	2000	2001
Other cyclic hydrocarbons:					
Canada	6,010	4,894	1,894	16,062	17,827
Germany	2,096	1,054	6,772	7,669	6,214
Netherlands	1,844	1,255	805	861	1,327
Japan	777	958	1,322	1,432	1,047
Belgium	554	1,593	961	539	951
Spain	0	0	0	0	415
All others	1,746	1,145	1,808	1,508	1,559
Total	13,027	10,899	13,562	28,070	29,341
Cyclohexanol, methylcyclohexanols and dimethylcyclohexanols:					
Germany	3	18	3	4	15
India	0	0	0	0	4
France	0	841	677	0	0
Japan	7,916	4,621	4,056	1,215	0
Netherlands	841	0	0	0	0
Canada	0	9	0	0	0
All others	34	23	4	0	0
Total	8,794	5,512	4,739	1,220	19
Phenol (hydroxybenzene) and its salts:					
Mexico	13,748	11,456	7,522	12,848	5,779
South Africa	0	0	341	0	1,261
Japan	28,168	27,245	10,972	0	382
Canada	253	261	361	336	329
Indonesia	0	0	42	26	19
United Kingdom	19	17	15	10	13
All others	39,728	43,710	51,067	11,825	10
Total	81,916	82,689	70,319	25,045	7,793
Phthalic anhydride:					
Mexico	6,594	6,179	4,826	5,216	3,335
Venezuela	2,978	793	1,566	2,081	1,800
Israel	57	0	25	1,243	1,205
Brazil	106	0	32	845	654
Korea	33	10	0	0	113
Turkey	0	190	0	296	90
All others	2	51	267	265	157
Total	9,769	7,223	6,714	9,947	7,353
Terephthalic acid and its salts:					
Belgium	0	3	4	0	20,952
Mexico	7,340	3,140	10,574	20,468	3,388
Spain	0	0	0	0	336
Indonesia	14	0	0	0	276
Korea	0	179	280	0	14
Canada	21	0	0	0	5
All others	238	167	0	13	0
Total	7,613	3,489	10,857	20,481	24,971

Table B-1–*Continued*
Organic commodity chemicals: U.S. imports for consumption, by principal sources, 1997-2001
(1,000 dollars)

Item/country	1997	1998	1999	2000	2001
Dimethyl terephthalate:					
Italy	0	0	0	0	4,672
Mexico	424	418	954	1,781	946
Germany	19	19	17	53	32
Spain	56	171	213	128	22
Brazil	0	13	294	583	0
Netherlands	0	0	0	4	0
All others	1	40	24	7	0
Total	500	661	1,502	2,556	5,672
Aniline:					
Germany	0	0	908	0	2,473
China	0	0	0	42	25
United Kingdom	5,868	7,596	6,062	0	9
Mexico	0	0	0	0	6
Japan	7,405	4,176	13	6	3
France	329	0	0	0	0
All others	3,757	0	3	2,835	0
Total	17,360	11,772	6,987	2,884	2,517
Aniline salts:					
Japan	190	10	10	0	5
China	0	0	0	0	3
Sweden	0	0	0	0	3
Germany	4	3	0	5	3
Total	194	13	10	5	14
6-Hexanelactam (epsilon-caprolactam):					
Brazil	4,008	3,138	1,824	3,642	2,668
Poland	149	1,629	1,780	837	2,097
Russia	13,432	25,784	811	685	523
Germany	22,765	2,003	95	4,709	337
Japan	0	117	254	253	253
Colombia	6,099	11,011	9,201	350	202
Belgium	7,105	21	102	43	123
All others	4,805	8,504	4,514	1,763	9
Total	58,362	52,207	18,582	12,282	6,213
Grand totals	922,767	740,657	777,781	1,200,671	1,020,782

Note.—Due to rounding, totals may not match the sum of all entries.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table B-2
Organic commodity chemicals: U.S. exports of domestic merchandise, by principal markets, 1997-2001

(1,000 dollars)

Item/country	1997	1998	1999	2000	2001
Cyclohexane:					
Canada	41,465	33,485	37,793	55,355	47,506
Mexico	7,854	10,023	9,011	37,771	27,729
Belgium	1,995	8,635	15,911	25,257	7,071
India	35	92	134	4,337	1,414
Venezuela	878	10	1,269	430	1,368
Netherlands	3,226	11,576	12,201	12,847	928
All Others	2,755	3,483	2,143	1,586	1,327
Total	58,208	67,304	78,461	137,584	87,343
Cyclanes, cyclenes and cycloterpenes (excluding cyclohexane):					
Netherlands	113	1,526	536	2,534	6,967
Brazil	411	223	460	1,030	4,948
France	11,992	9,901	5,777	3,547	3,255
United Kingdom	2,578	2,836	2,239	1,558	2,890
Mexico	4,149	1,037	1,716	2,644	2,625
Belgium	3,981	2,256	4,380	4,079	2,599
All others	14,889	7,797	8,635	13,151	10,719
Total	38,113	25,576	23,743	28,542	34,003
ortho-Xylene:					
Mexico	1,686	2,027	2,546	15,741	16,577
Netherlands	7,460	2,107	1,300	12,623	2,646
Venezuela	0	0	570	3,099	2,496
India	5,469	1,547	990	0	1,315
Canada	230	575	496	518	831
El Salvador	0	0	0	0	9
All others	4,727	2,184	2,262	1,000	30
Total	19,572	8,441	8,164	32,982	23,903
meta-Xylene:					
Belgium	0	21,615	16,297	23,193	14,644
Egypt	0	0	0	69	32
Korea	0	11,074	3,411	0	24
Canada	6	0	6	3	7
Trinidad and Tobago	0	0	8	17	6
Mexico	0	6	3,094	6	3
All others	63	10	1,278	130	0
Total	69	32,705	24,094	23,418	14,716
para-Xylene:					
Mexico	112,815	98,628	121,167	239,020	251,845
Taiwan	31,651	37,609	30,645	69,917	24,569
Brazil	6,674	14,676	2,101	18,672	17,441
Pakistan	0	3,972	3,632	4,831	12,277
Malaysia	7,185	10,990	13,966	32,704	10,155
Korea	43,511	18,558	23,561	51,369	9,743
All others	33,130	43,125	65,675	24,195	17,634
Total	234,966	227,558	260,747	440,708	343,664

Table B-2–*Continued*
Organic commodity chemicals: U.S. exports of domestic merchandise, by principal markets, 1997-2001

(1,000 dollars)

Item/country	1997	1998	1999	2000	2001
Styrene:					
Mexico	77,870	92,138	133,104	209,143	182,237
Taiwan	65,050	38,361	154,230	168,763	59,997
Colombia	47,562	39,377	38,999	57,473	44,277
Canada	21,484	21,646	32,596	42,984	36,289
Venezuela	25,871	12,876	18,199	29,237	25,816
Netherlands	54,297	75,939	117,636	125,832	24,804
All others	98,905	70,729	133,130	288,825	59,558
Total	391,039	351,068	627,894	922,257	432,977
Ethylbenzene:					
Netherlands	19,488	14,229	1,790	4,713	2,956
Japan	445	589	475	458	340
Mexico	187	282	53	157	226
Canada	4	131	126	118	85
Thailand	111	136	109	147	82
Germany	0	0	0	63	34
All others	11,768	3,860	3,009	13,090	33
Total	32,003	19,227	5,561	18,745	3,758
Cumene:					
Belgium	8,762	2,892	4,834	15,184	24,258
Netherlands	21,108	28,072	22,340	41,993	11,928
Mexico	4,143	10,900	17,505	22,786	10,392
India	7,263	1,455	6,235	11,031	8,639
Italy	0	0	0	0	5,575
United Kingdom	0	2,540	6,799	0	4,443
All others	3,517	23,623	4,822	32,291	3,136
Total	44,793	69,482	62,537	123,284	68,371
Dodecylbenzene:					
Mexico	1,137	0	20	11	110
Italy	61	142	332	121	60
Korea	46	0	0	22	34
United Kingdom	0	0	0	0	8
Japan	0	0	0	0	5
Barbados	0	0	0	0	4
All others	268	296	45	270	0
Total	1,512	438	397	424	221
Other alkyl and polyalkyl benzenes:					
Mexico	1,333	422	3,934	49	15,923
Netherlands	2,389	2,524	2,882	2,125	3,890
Thailand	3	9	2,222	90	3,756
France	462	269	509	52	1,848
India	54	2,390	5	49	1,402
Japan	930	1,043	907	1,284	1,324
All others	6,185	3,739	8,439	4,220	6,326
Total	11,355	10,395	18,897	7,868	34,470

Table B-2–*Continued*
Organic commodity chemicals: U.S. exports of domestic merchandise, by principal markets, 1997-2001

(1,000 dollars)

Item/country	1997	1998	1999	2000	2001
Anthracene, biphenyl and cyclic hydrocarbons not elsewhere specified or included:					
Mexico	819	1,466	5,440	1,579	4,348
Netherlands	4,773	2,611	1,375	3,587	3,763
Canada	2,597	2,560	2,066	3,042	3,077
Belgium	414	89	648	5,977	1,796
Brazil	206	229	76	1,102	1,574
Italy	1,107	1,162	1,332	2,432	1,418
All others	9,140	11,325	12,048	12,035	4,013
Total	19,056	19,441	22,985	29,755	19,989
Cyclohexanol, methylcyclohexanols and dimethylcyclohexanols:					
Japan	0	0	32	131	470
Taiwan	0	10	0	0	157
Mexico	56	97	49	13	50
Nauru	0	0	0	0	16
Qatar	0	0	0	0	10
Chile	0	0	0	0	4
All others	324	418	208	107	13
Total	380	525	289	251	721
Phenol (hydroxybenzene) and its salts:					
Canada	63,144	68,547	49,820	61,367	79,808
Netherlands	7,933	9,971	4,183	24,126	21,251
Brazil	2,012	829	140	12,898	12,324
Korea	2,249	950	3,103	7,814	11,111
China	924	0	3,323	8,783	8,232
Argentina	1,048	5,862	3,169	2,282	5,188
All others	19,487	22,709	18,774	40,670	33,154
Total	96,797	108,867	82,512	157,939	171,069
Phthalic anhydride:					
Canada	12,122	9,477	12,740	14,779	12,444
Taiwan	2,473	1,117	0	0	2,375
Indonesia	238	127	31	130	151
Mexico	333	9	383	1,862	138
Philippines	18	15	6	26	20
Korea	10	0	6	12	18
All others	144	244	169	4	10
Total	15,338	10,990	13,336	16,813	15,157
Terephthalic acid and its salts:					
Canada	80,992	83,199	82,614	79,816	91,001
Argentina	3	10,744	21,115	0	36,350
Indonesia	11,989	397	0	0	523
Brazil	9,752	8.969	5,776	2,713	363
Mexico	0	11	0	24	14
Dominican Republic	0	0	0	0	11
All others	88,329	86,740	35,434	6.940	0
Total	191,064	190,060	144,939	89,492	128,262

Table B-2–*Continued*
Organic commodity chemicals: U.S. exports of domestic merchandise, by principal markets, 1997-2001

(1,000 dollars)

Item/country	1997	1998	1999	2000	2001
Dimethyl terephthalate:					
Brazil	4	9	52	12	985
Taiwan	275	0	393	2,297	645
Mexico	0	0	167	879	246
Colombia	0	0	0	0	33
Israel	0	0	0	0	22
United Kingdom	0	0	0	11	12
All others	3,323	4,751	1,808	192	7
Total	3,603	4,760	2,420	3,391	1,949
Aniline and its salts:					
Korea	686	0	3,269	9,375	11,863
India	0	2,206	0	42	690
Japan	2,854	3,584	2,594	3,291	483
China	158	767	0	0	474
Mexico	1,783	1,517	1,770	893	433
Netherlands	216	1,402	1,987	1,431	359
All others	829	1,793	722	912	538
Total	6,526	11,269	10,343	15,944	14,842
6-Hexanelactam (epsilon-caprolactam):					
Taiwan	75,928	64,593	45,092	58,262	41,535
Canada	39,679	38,438	31,878	29,388	39,423
Korea	3,303	5,022	4,668	3,043	11,834
Indonesia	0	0	0	0	3,111
China	0	3	540	6	1,624
Argentina	0	0	0	1,303	1,146
All others	94	116	4,026	4,865	244
Total	119,004	108,172	86,205	96,867	98,916
Grand totals	1,283,396	1,266,276	1,473,522	2,146,265	1,494,331

Note.—Due to rounding, totals may not match the sum of all entries.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Industry & Trade Summary

Cut Flowers

USITC Publication 3580
February 2003

OFFICE OF INDUSTRIES
U.S. International Trade Commission
Washington, DC 20436

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PREFACE

In 1991 the United States International Trade Commission initiated its current *Industry and Trade Summary* series of informational reports on the thousands of products imported into and exported from the United States. Each summary addresses a different commodity/industry area and contains information on product uses, U.S. and foreign producers, and customs treatment. Also included is an analysis of the basic factors affecting trends in consumption, production, and trade of the commodity, as well as those bearing on the competitiveness of U.S. industries in domestic and foreign markets.[1]

This report on cut flowers covers the period 1997-2001. Listed below are the individual summary reports published to date on the agriculture and forest products sectors.

USITC publication number	***Publication date***	***Title***
2459	November 1991	Live Sheep and Meat of Sheep
2462	November 1991	Cigarettes
2477	January 1992	Dairy Produce
2478	January 1992	Oilseeds
2511	March 1992	Live Swine and Fresh, Chilled, or Frozen Pork
2520	June 1992	Poultry
2544	August 1992	Fresh or Frozen Fish
2545	November 1992	Natural Sweeteners
2551	November 1992	Newsprint
2612	March 1993	Wood Pulp and Waste Paper
2615	March 1993	Citrus Fruit
2625	April 1993	Live Cattle and Fresh, Chilled, or Frozen Beef and Veal
2631	May 1993	Animal and Vegetable Fats and Oils
2635	June 1993	Cocoa, Chocolate, and Confectionery
2636	May 1993	Olives
2639	June 1993	Wine and Certain Fermented Beverages
2693	October 1993	Printing and Writing Paper
2702	November 1993	Fur Goods
2726	January 1994	Furskins
2737	March 1994	Cut Flowers
2749	March 1994	Paper Boxes and Bags
2762	April 1994	Coffee and Tea

[1] The information and analysis provided in this report are for the purposes of this report only. Nothing in this report should be construed to indicate how the Commission would find in an investigation conducted under statutory authority covering the same or similar subject matter.

PREFACE—*Continued*

USITC publication number	*Publication date*	*Title*
2859	May 1995	Seeds
2865	April 1995	Malt Beverages
2875	May 1995	Certain Fresh Deciduous Fruits
2898	June 1995	Certain Miscellaneous Vegetable Substance and Products
2917	October 1995	Lumber, Flooring, and Siding
2918	August 1995	Printed Matter
2928	November 1995	Processed Vegetables
3015	February 1997	Hides, Skins, and Leather
3020	March 1997	Nonalcoholic Beverages
3022	April 1997	Industrial Papers and Paperboards
3080	January 1998	Dairy Products
3083	February 1998	Canned Fish, Except Shellfish
3095	March 1998	Milled Grains, Malts, and Starches
3096	April 1998	Millwork
3145	December 1998	Wool and Related Animal Hair
3148	December 1998	Poultry
3171	March 1999	Dried Fruits Other Than Tropical
3268	December 1999	Eggs
3275	January 2000	Animal Feeds
3350	September 2000	Grain (Cereals)
3352	September 2000	Edible Nuts
3355	September 2000	Newsprint
3373	November 2000	Distilled Spirits
3391	January 2001	Cotton
3405	March 2001	Sugar
3461	October 2001	Cured Fish
3463	October 2001	Fresh or Frozen Fish
3490	February 2002	Wood Pulp and Waste Paper
3476	February 2003	Oilseeds

CONTENTS

Page

Preface i

Abstract 1

Introduction 3

The product 4
Production process 5
Fresh cut flowers 5
Dried and preserved flowers 7

U.S. industry profile 8

Industry structure 8
Cut flower operations 8
Geographic distribution 11
Employment 12
Vertical integration 13
Globalization in the cut flower industry 14
Marketing methods 15
Pricing practices 16
Research and development 16

U.S. market 17

Consumer characteristics and factors affecting demand 17
Consumption 18
Production 19

U.S. trade 19

Overview 19
U.S. imports 21
Import levels and principal suppliers 22
Logistics 24
U.S. trade measures 24
Tariff measures 24
Nontariff measures 26

CONTENTS—*Continued*

Page

U.S. trade—*Continued*

U.S. Government trade-related investigations 27
U.S. exports 27
Principal markets and export levels 27
Foreign trade tariff and nontariff measures 28

Foreign industry profile 29

Global trade and market conditions 29
Netherlands 29
Colombia 31
Ecuador 31
Israel 32
Eastern and Southern Africa: Kenya, South Africa, and Zimbabwe 32

Appendixes

A. Explanation of tariff and trade agreement terms A-1

Figures

1. Major distribution channels for fresh cut flowers in the United States 9
2. Major distribution channels for preserved flowers in the United States 10

Tables

1. Fresh cut flowers: U.S. production in major producing States, 1997-2001 11
2. Cut flowers: U.S. production, exports of domestic merchandise, imports for consumption, and apparent consumption, 1997-2001 18
3. Fresh cut flowers: U.S. production, by major flower types, 1997-2001 20
4. Cut flowers: U.S. exports of domestic merchandise, imports for consumption, and merchandise trade balance, by selected countries, 1997-2001 21
5. Fresh cut flowers: U.S. imports for consumption, by principal sources, 1997-2001 22
6. Preserved flowers: U.S. imports for consumption, by principal sources, 1997-2001 23
7. Cut flowers: U.S. imports for consumption, by major types, 1997-2001 24
8. Cut flowers: Harmonized Tariff Schedule subheading; description; U.S. col. 1 rate of duty as of Jan. 1, 2002; U.S. exports, 2001; and U.S. imports, 2001 25
9. Fresh cut flowers: U.S. exports of domestic merchandise, by principal markets, 1997-2001 27
10. Preserved flowers: U.S. exports of domestic merchandise, by principal markets, 1997-2001 28

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ABSTRACT

This summary addresses trade and industry conditions for fresh and preserved cut flowers for the period 1997-2001.

- Over the last two decades the U.S. market for fresh cut flowers has become increasingly served by imports. The United States is an important market for South American growers, especially those in Colombia and Ecuador, because of strong U.S. demand and high disposable incomes. These and other developing country producers have a competitive advantage over U.S. growers because of their low wage rates, smaller climate control investments, and weaker currencies.

- Due to increased global supply of fresh cut flowers, especially roses, since the early 1990s, fresh cut flower import prices have fallen significantly. In the face of increasing low-priced import competition, many U.S. growers have shifted production to specialty cut flowers that are not imported in significant volumes, and to other floriculture crops. U.S. production of roses and certain other flowers has fallen significantly. Sales by U.S. fresh cut flower growers, except in Western States, have fallen to about one-half of 1992 levels.

- Almost 85 percent of total U.S. imports of cut flowers in 2001 entered duty-free under preferential trade programs. The majority of those imports entered under the Andean Trade Preferences Act that benefits Bolivia, Colombia, Ecuador, and Peru.

- In addition to Latin America, governments in Africa and Asia have encouraged the development of cut flower export industries in their countries as a mechanism to employ large numbers of semiskilled workers and to attract U.S. dollars to their economies. The Netherlands, Colombia, and Ecuador are the largest exporters of cut flowers in the world; however, Eastern and Southern African countries such as Kenya, South Africa, and Zimbabwe are becoming important players in the global cut flower export market.

INTRODUCTION

This summary covers fresh or preserved cut flowers classified for tariff purposes in chapter 6, heading 0603 of the Harmonized Tariff Schedule of the United States (HTS), which provides for fresh and preserved cut flowers.[1] Also included within the scope of this summary are bouquets, floral baskets, wreaths, and similar articles made wholly or partly from fresh cut and preserved flowers, which account for a significant share of final consumption of fresh cut and preserved flowers.[2] However, fresh cut and preserved flower production are valued in this summary at their first stage of production. Information is presented on the structure of the U.S. industry, imports and exports, consumers, foreign industries, and domestic and foreign tariff and nontariff trade measures. The analysis primarily covers the time period from 1997-2001.

The United States is the third-largest producer of cut flowers in the world; production was valued at $424 million in 2001, down from $472 million in 1997. Almost all domestic production serves the U.S. market, which has seen increasing demand for cut flowers since the late 1980s. The United States has one of the most diverse cut flower markets, with all types of fresh flowers arriving from all over the world. Roses are the leading fresh cut flower produced and consumed in the United States (based on value) and, in 2001, accounted for almost 30 percent of fresh cut flower shipments. Chrysanthemums and carnations accounted for nearly 10 percent each. As a result of increasing imports over the last two decades, U.S. production of certain flowers, especially roses, has fallen significantly.

The majority of the U.S. market for fresh cut flowers is served by imports. The United States is an important market for foreign growers, mostly from South America, because of strong demand and high disposable incomes. Imports were valued at $551 million in 2001, down from $579 million in 1997. Imports supplied approximately 60 percent of U.S. consumption during the period 1997-2001, with Colombia supplying more than one-half of such imports. Imports from Ecuador and the Netherlands together accounted for about one-quarter of the total. Fresh cut roses, carnations, and chrysanthemums were the principal types of cut flowers imported. Mexico was the principal supplier of preserved flowers.

In recent years, fresh cut flowers have accounted for 85-90 percent of U.S. consumption of products covered by this summary. Data are not available on the principal preserved flowers produced and consumed in the United States, but delphinium, roses, lavender, and statice are believed to be the most important.

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[1] The HTS defines the product as "fresh cut flowers and flower buds used in bouquets or for ornamental purposes, and dried, dyed, bleached, impregnated or otherwise prepared cut flowers used in bouquets or for ornamental purposes."

[2] Other floriculture crops, such as potted flowering plants, foliage plants, and bedding/garden plants (provided for in HTS heading 0602), or cut greens, foliage, and ornamental grasses (provided for in HTS heading 0604), are not covered in this summary.

The Product

Cut flowers are parts of plants, characteristically including the blooms or "inflorescences" and some attached plant materials, but not including roots and soil. Fresh cut flowers are highly perishable because they maintain only limited life-supporting processes by taking water up through their stems. Fresh cut flowers are used for decorative purposes such as vase arrangements and bouquets at formal events; designs for weddings and funerals; gifts on occasions such as Mother's Day, Valentine's Day, in times of illness, and at holidays such as Christmas and Easter; corsages and boutonnieres; and informal displays to beautify homes and public places. More than 200 different types of fresh cut flowers are sold in the United States.

Preserved flowers are fresh cut flowers that have been dehydrated, preserved with a chemical solution and then air- or oven-dried. They may be used in boutonnieres, corsages, wreaths, formal and informal displays, and similar ornamental articles. Preserved flowers, known in the industry as "everlasting flowers" or "everlastings," are not as perishable as fresh cut flowers.

The three principal types of fresh cut flowers produced in the United States and the world are roses, carnations, and chrysanthemums. Roses are deciduous woody perennials that can be used for cut flowers, drying and preserving, and for landscaping.[3] Roses are members of the Rosacea family; at least 100 species and thousands of varieties are known to exist. The most commercially important types of roses are sweetheart (intermediate), hybrid tea, and spray roses. Sweetheart roses have one small bloom per stem, generally one-half inch to 2 inches in diameter, and are typically used in bridal bouquets. Hybrid tea roses also have one bloom per stem but with a much larger flower head, ranging from 3 to 6 inches in diameter. Spray roses are a relatively newer variety with multiple blooms, one-half inch to 2 inches in diameter, growing off of a single stem. Although the most typical roses are red, they may be almost any color except true blue or black.[4] As fresh cut flowers, roses may last 3 to 7 days in the home without the use of floral preservatives, depending on the variety of the rose and environmental factors such as temperature and care. The vase life of a rose can be doubled when floral preservatives are used.

Carnations are members of the Caryophyllaceae or so-called "pink" family. These relatively inexpensive flowers are divided into two major groups, the standards and the miniatures. Standard carnations produce double, fragrant flowers 2 to 3 inches across, borne singly on wiry stems that are 18 to 24 inches long. Carnations may be white, yellow, pink, red, or multicolored. White carnations are often artificially colored with hues absent in natural cultivars. Carnations last from 7 to 10 days as cut flowers without the use of a floral preservative and up to several weeks when a floral preservative is used.

Chrysanthemums are a genus of the Compositae family. The major groups grown commercially are standards and pompons. Chrysanthemums may be white, yellow, red, bicolored, or tricolored; they can also be artificially colored. Standard chrysanthemums have 1 flower per stem (stems range from 18 to 36 inches), with the diameter of each bloom

[3] Roses used for landscaping are not included in this summary.

[4] Ann Hooper, "Roses: the straight scoop," *Flower & Garden,* Jan. 2001, Vol. 45, Issue 1, p. 22.

ranging from 3 to 8 inches. Pompon chrysanthemums have 4 to 6 flowers per stem (stems range from 18 to 30 inches) with a diameter of 3 to 5 inches. As fresh cut flowers, pompons last from 10 to 14 days, and standards last from 7 to 12 days, depending on variety and temperature. Chrysanthemums have been successfully bred into a wide variety of colors, shapes, and textures, making them the flower of choice for the mass-market bouquet business.[5]

Production Process

Fresh Cut Flowers

When, in 1918, researchers at Cornell University proved that plant growth responds to day length, horticulturists began to artificially control flower exposure to daylight. This discovery made year-round flowering possible, significantly increasing the economic value of flowers.

Today, flower production occurs throughout the year in the United States, in open fields or within a protective structure. The production method primarily depends on the environmental conditions of the area and quality considerations. In 1997, the most recent year for which detailed data are available, flower production took place on approximately 3,444 covered acres (150 million square feet) and approximately 36,000 acres of open fields.[6] Data for all floriculture crops show that in 2001 approximately 21,400 acres were cultivated under some sort of protective structure, while about 41,000 acres were grown on open fields.[7]

The propagation of flowering plants can be by means of seed, cuttings (either stem tips or rooted cuttings), bulbs, grafting, or by the process of division. In a covered setting, the propagative material is typically placed in a mixture of organic material in a raised greenhouse bench, a shallow concrete box usually 4 feet wide and raised 24 to 36 inches for drainage. Before planting, the soil is prepared, either by sterilization with steam or the application of chemicals. Growers may also use prepackaged soilless media (rice hulls, coir, sand, or composted bark), which have already been pasteurized to kill pathogens, weeds, and seeds. Soil preparation usually takes place between each harvest. Although seeds or cuttings are planted directly into the greenhouse bench, bulbs are generally stored and monitored in cool, dark rooting rooms until they sprout, then transferred to the organic material in the greenhouse. Wire or plastic mesh is often used to support certain flowers (e.g. roses and chrysanthemums) as they grow, thereby encouraging a long straight stem. Drip irrigation lines are generally used to reduce spotting of the flower petals, soil splashing onto the foliage, and the spread of disease. Water may be treated by reverse osmosis and injected with fertilizers before being applied to plants.

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[5] Win Winogrond, "Cut flowers on the move," *The History of U.S. Floriculture*, (Greenhouse Grower, Meister Publishing Fall 1999).

[6] USDA, Economic Research Service, Market and Trade Economics Division, *Floriculture and Nursery Crops Situation and Outlook Yearbook*, FLO-2002, May 2002. Data includes acreage for cultivated cut greens, which are not included in the scope of this summary.

[7] USDA, ERS, *Floriculture and Nursery Crops Outlook*, Sept. 2002.

The greenhouse structure may form a completely controlled environment, or just provide shade or protection from the wind, e.g., an overhead lattice work or a "poly-house" (an aluminum or steel framework covered with a double layer of polyethylene film). While a glass greenhouse is the most durable structure, greenhouse panes made of fiberglass sheets may also be used and typically last 10 to 20 years without replacement. The "poly-house," made longer lasting than its predecessors by the availability and low cost of high technology plastics, may last for up to 4 years. The latter requires significantly less capital investment than the other types of covered structures and accounts for the majority of protected growing areas in the United States.[8]

Air temperature in the greenhouse is commonly controlled by central steam boilers or individual unit heaters fueled by natural gas or propane and are often combined with horizontal air flow fan systems to circulate air. Common heating systems for the root-zone of the plants are electrical-resistance heating strips or pads and small boiler systems that warm the water as it flows through an array of small tubes under the propagating units. Some greenhouses are equipped with computer systems that regulate environmental factors such as heating, cooling, irrigation, fertilization, carbon dioxide, and ceiling shade blackout for artificial night. Supplemental lighting is often used to control flowering and quality.

During the production process, approximately 50 percent of all direct labor is used in harvest activities.[9] At harvest, laborers carefully inspect plants for the proper picking stage. Flowers are harvested when the proper stem length and inflorescence required for sale in the wholesale market are reached. Generally, the optimal stage of growth for harvesting is when the flower has just opened. Stems with more than one flower are usually harvested with less than one-third of the flowers fully opened. The flower stem is cut at the appropriate length by hand with a sharp knife or pruning shears. Since flower condition will not improve after picking, growers must calculate the cutting precisely so that the flower will not be past its prime when it reaches the consumer.

Postharvest handling methods developed more than 20 years ago on domestically produced flowers are still current practice in the fresh flower industry.[10] Many growers harvest by accumulating an armful of flowers as they move along an aisle, whereas others employ picking carts and/or conveyor systems. Some growers have automated systems that can strip leaves, trim stems, and uniformly bunch flowers that may then be transported on specially-designed monorails suspended on tracks from the ceiling of the greenhouse. With automated systems, surfaces are padded to minimize damage to the flowers. In the packing warehouse, stems are cut for a second time while submerged in water to allow the water to move up the stems. They are immediately placed in tepid water (110 degrees) with added

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[8] In 2000, USDA reported that 68 percent of the total covered growing area was dedicated to film plastic structures, while fiberglass and glass structures accounted for 18 and 14 percent, respectively. Total growing area includes area dedicated to all floriculture crops, including bedding and garden plants and cut cultivated greens, which are not included in the scope of this summary. USDA, National Agricultural Statistics Service, *2000 Floriculture Crops Summary*, Apr. 2001.

[9] Mary Albrecht, Alan Stevens, Susan Stevens, *Starting a Greenhouse Business - A Commercial Grower's Guide*, (Kansas State University, Cooperative Extension Service, June 1994).

[10] Terril A. Nell, Ayumi Suzuki, Ria T. Leonard, James E. Barrett, and David G. Clark, "Developing Protocols for Cut Flower Longevity," Department of Environmental Horticulture, University of Florida, and Michael S. Reid, University of California, Davis, CA, found at *www.endowment.org/projects/nell99.htm*, retrieved Jan. 23, 2003.

floral preservative for at least 2 to 3 hours to allow for a maximum amount of water uptake. They can be left temporarily in a cool (less than 60 degrees) location or stored in a 40 degree cooler overnight for subsequent grading. Flowers that do not retain water and are not kept at low temperatures will lose water and wilt quickly.

Grading of cut flowers is done to ensure consistent standards. Stems are generally graded by stem length (18 to 24 inches for most flower types) and are downgraded for short or broken stems, poor flower condition, poor foliage condition, or old flowers.[11] Sorting machines are able to grade flowers by length of stem, however, all other factors are still determined by human decision-making. Pompon chrysanthemums are graded into 250- to 340-gram bunches containing several stems, while standard chrysanthemums of equal sizes are graded in groups of 10 or 12. The flower buds are wrapped in cone-shaped plastic sleeves to prevent damage. Carnations are usually separated into piles of 3 grades, each grade is then bunched into units of 25 stems. For roses, 25 flowers from an individual grade are bunched with the heads on an even plane. Stems are then tied together with string and parchment, or waxed paper is wrapped around the heads for protection.

Flowers that are destined for nationwide sale are carefully prepared to maintain flower quality. Boxes are often packaged using "wet packs" to allow the flowers to remain in water throughout their transport. Packed boxes can be pre-cooled by units that fill them with 98 percent humid, cool air for added protection. The boxes are then transported by refrigerated truck or by air to customers.

Dried and Preserved Flowers

The production process for dried and preserved flowers is similar to that of cut flowers up to the point of harvesting. Flowers are cut, bunched, and then dehydrated in mechanical dryers or in the sun, or preserved chemically. Preserved flowers are placed in a solution of glycerin and water for a period of 3 to 7 days. As the solution is drawn up the plant stem and into the flowers, the water in the plant tissue is replaced with glycerin, yielding a final product that will remain soft and pliable for several years. Since the flowers naturally turn brown as the tissues degrade, dye may be placed in the solution to be drawn up the stem. The glycerin-preserved flowers are then placed in industrial dryers at a temperature of about 60 to 75 degrees Fahrenheit while fans remove humidity from the air. Colors can also be applied to the flowers after drying by immersing the flower bundles in hot vegetable-based dyes. The dyed flowers are then returned to the dryer for a period of 3 to 4 days. When the drying process is complete, the flowers are arranged and then packaged for retail sale.

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[11] Scott M. Aker and William E. Healy,"Enterprise Guide for Southern Maryland: Producing Cut Flowers - General Field Crop Management," Fact Sheet-468 Department of Horticulture, The University of Maryland, 1991.

U.S. INDUSTRY PROFILE

Industry Structure

The structure of the U.S. fresh cut flower industry is illustrated in figure 1.[12] Although market channels for cut flowers are growing increasing complex, most fresh cut flower production moves through the traditional market channels, from growers to wholesalers to retail florists, and finally to consumers. The U.S. industry is generally characterized as fragmented because each of these industry segments has unique issues and perspectives. The majority of preserved flowers go from processors to wholesalers to craft stores or retail florists, and finally to the consumer (figure 2).

Fresh cut flower growers may sell their products to a flower wholesaler, a florist, or directly to the consumer. Very small quantities of fresh cut flowers are sold for further processing. Those growers who focus on selling to wholesalers or florists generally specialize their operations and limit the number of species grown to one or two. Growers who sell directly to consumers may grow as many as 15 to 20 different species, with at least 5 available for sale at any time.[13] Some cut flower producers have horizontally integrated by using existing space to produce other horticultural products such as foliage plants and hanging flower baskets, which are not covered in this summary. In the greenhouse, efficiency can be gained by growing these products in the space above the fresh cut flower crop.

Dried and preserved flowers fall into the market segment that also includes dried and preserved foliage and other plant materials such as pods, sticks, stalks, and weeds, which are not included in this summary. Dried and preserved flowers make up a very small part of the dried and preserved plant materials industry as only certain flower types and varieties lend themselves to the rigors of the preservation and/or drying processes.[14]

Cut Flower Operations

The total number of U.S. fresh cut flower growers declined by 34 percent from 3,120 in 1988 to 2,067 in 1998 (the only recent years for which official statistics are available on a disaggregated basis).[15] More recent data show that, for growers with more than $100,000 in

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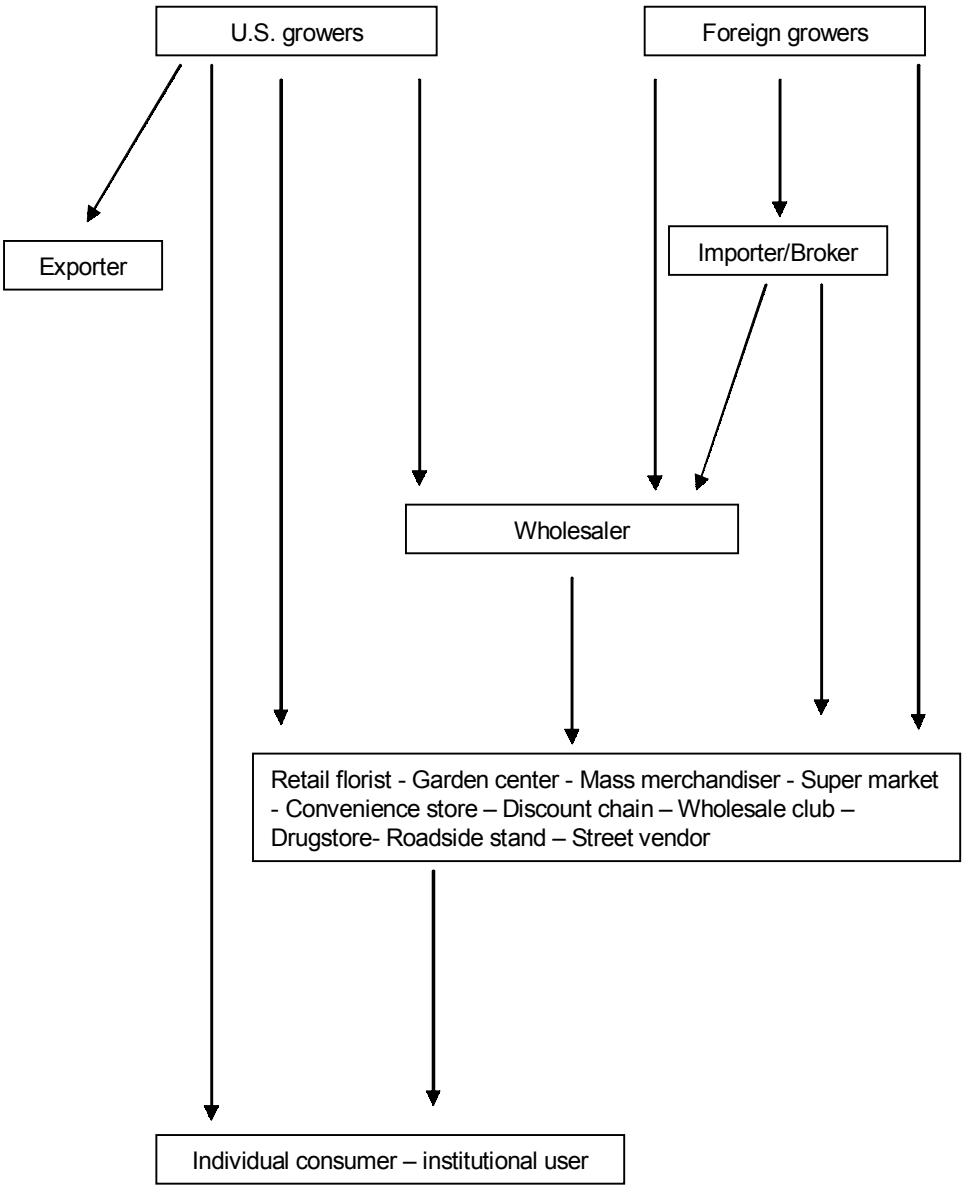
[12] Cut flower production is covered by North American Industry Classification system (NAICS) code 111422, which covers establishments primarily engaged in growing and/or producing horticulture products, etc.

[13] "Specialty Cut Flowers: A Commercial Growers Guide" (Kansas State University, Agricultural Experiment Station and Cooperative Extension Service, June 1992).

[14] Common flowers used for preservation in the U.S. are delphinium, larkspur, roses, lavender, and statice.

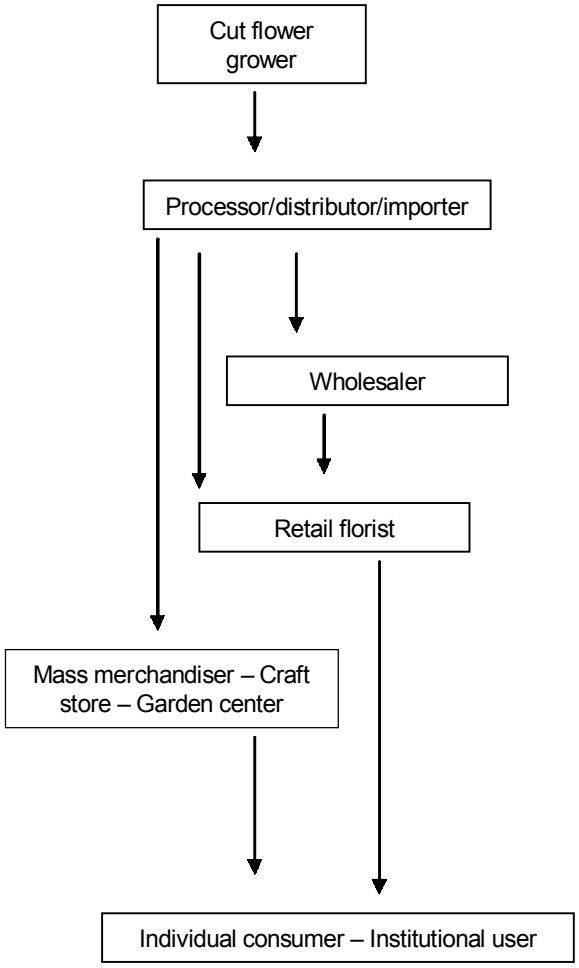
[15] U.S. Bureau of the Census, *Census of Horticultural Specialties (1998)*, Vol. 3, Special Studies, Part 2, Mar. 2000.

Figure 1
Major distribution channels for fresh cut flowers in the United States



Source: U.S. International Trade Commission.

Figure 2
Major distribution channels for preserved flowers in the United States



Source: U.S. International Trade Commission.

sales, there were 615 cut flower growers in 2001, down from 760 in 1997.[16] The U.S. fresh cut flower industry has been going through a prolonged period of consolidation and contraction in the number of growers, with the remaining growers obtaining larger volumes. Most fresh cut flower-growing operations are family owned and operated, and the industry is not generally described as highly concentrated. Although a large number of growers operate less than 20,000 square feet of growing space, a few large firms cultivate several million square feet in flower production.[17]

Geographic Distribution

In the early 1900s U.S. cut flower production was centered around the large population centers such as New York City, Boston, Philadelphia, and Chicago. The expansion of the interstate highway system in the 1950s facilitated the transportation of goods over longer distances, and cut flower growers moved west in search of more favorable growing conditions. Producers settled predominantly in Colorado, in the area around Denver, and throughout California.

Today, although fresh cut flowers are commercially grown in nearly every State, California is by far the largest fresh cut flower producer, accounting for 66 percent of annual U.S. production during 1997-2001. Florida, Washington, Hawaii, Oregon, New Jersey, and Michigan are also important fresh cut flower producing States, together accounting for 20 percent of annual U.S. production in 2001. California, Florida, and Hawaii have climates that are especially conducive to year-round flower production. Washington ramped up production over the last 5 years, moving from the sixth most important State in 1997 to third place in 2001. Colorado lost importance during the period, cutting production by one-half between 1997 and 2001 (table 1).

Table 1
Fresh cut flowers: U.S. production in major producing States,[1] 1997-2001

State	1997	1998	1999	2000	2001
	Value *(1,000 dollars)*				
California	307,557	261,548	279,611	288,441	292,115
Florida	29,241	27,398	28,293	28,119	23,168
Washington	11,745	17,736	23,295	19,624	18,857
Hawaii	15,622	14,383	17,461	16,436	16,221
Oregon	10,499	10,214	10,338	10,195	10,698
New Jersey	11,916	8,495	9,194	7,128	8,533
Michigan	11,514	8,551	4,995	7,624	8,119
Colorado	12,932	11,425	10,749	8,156	6,440
All other	60,543	51,845	47,688	44,240	40,105
Total	471,569	411,595	431,624	429,963	424,256

[1] Data are for production in 36 major producing States for operations with $100,000 or more in annual sales.

Source: Compiled from official statistics from the U.S. Department of Agriculture.

[16] USDA, National Agricultural Statistics Service, *Floriculture Crops Summary*, Apr. 1998, Apr. 2002.

[17] John Bartok, "Automating an Industry," *Greenhouse Grower*, Fall 1999.

There are believed to be three to four large producers of preserved flowers although there are probably several hundred small-scale ("mom and pop") producers. Most preserved cut flower operations are family owned and operated. However, the industry is concentrated, with one firm dominating.

Employment

Cut flower production requires strict adherence to sanitation and handling requirements to produce quality finished products. Relatively skilled labor is required in the production of cut flowers; most of these skills are learned from on-the-job experience and not from formal education. Data on employment in the U.S. fresh cut flower industry are not available, since workers used to produce fresh cut flowers are used to produce a variety of other floriculture crops at the same time. A considerable amount of actual labor in the fresh cut flower sector is "unpaid" labor of the grower and other family members. It is estimated that the fresh cut flower industry employed 7,500 full time workers and 5,000 part-time workers annually during 1997-2001.[18] It is estimated that the preserved flower industry employs about 1,000 workers.[19]

Operations such as planting, harvesting, grading, and packaging traditionally require hand labor, making labor inputs a significant component of production costs in the cut flower industry. Labor costs generally account for 25-30 percent of a flower sales value. Recently however, growers have found that the scarcity of workers is driving labor costs up. Automation has increasingly been introduced to keep labor costs down or when extra workers are not available, but such methods can require significant initial capital expenditures.

Mechanization in the greenhouse generally consists of conveyors to move flowers, seeders, and automated irrigation. Seeders inject seeds through a nozzle or needle in a manifold that places one row of seeds at a time, up to 100 trays per hour. With drip irrigation, a series of small plastic tubes reach into each flower pot from a ½- to ¾-inch main line extending the length of a greenhouse bench. With this method, every plant is irrigated at the same time with exactly the same amount of water. Although automation can significantly reduce grower costs, manufacturers of specialized equipment have not been attracted to the cut flowerindustry because of the large number of growers who operate less than 20,000 square feet of growing space and find the capital expense difficult to justify.[20]

However, highly automated greenhouses and technological advancements resulting from extensive applications of research and development do occur in the industry, generally by the larger growers. These advancements have yielded greater productivity and efficiency at the grower level.[21]

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[18] Estimated by staff of the U.S. International Trade Commission.

[19] Ibid.

[20] John Bartok, "Automating an Industry," *Greenhouse Grower*, Fall 1999.

[21] Will Carlson, and Dick Meister, "Technology and Productions," *Greenhouse Grower*, Fall 1999.

Vertical Integration

Flowers can be marketed by the grower to a flower wholesaler, a retail florist, or directly to the public by a street vendor or at a farmers market. Traditionally, wholesalers consolidate product from various growers and sell smaller units to retail outlets. The wholesaler's product is often on consignment from the grower; the wholesaler finds buyers for the product and pays the grower a portion of the sale. Wholesalers have traditionally passed information regarding demand trends back to the grower who can then modify production accordingly.

Today, market channels for fresh cut flowers are increasingly complex.[22] Since in large part the production of fresh cut flowers for the U.S. market has shifted overseas, some importers are fulfilling the traditional wholesaler's role, aggregating product from offshore producers and farms, and selling directly to retail outlets. Some large U.S. retailers work directly with brokers who get foreign producers to meet the retailers' specific requirements.[23] Some importers located in Miami are merely extensions of Latin American growers' operations. Vertical integration has allowed some wholesalers to provide better service and more services than their competitors.[24] For example, wholesalers/importers/brokers have set up bouquet-making operations at the Miami airport or offshore and then ship the final product, a fully arranged bouquet, directly to retail outlets.[25]

Cut flower producers in the United States have adapted to the changing market structure. Some have formed shipping companies and wholesale businesses to market their own production as well as that of other domestic and foreign producers. Others have established retail outlets to market cut flowers. In some cases, retail outlets have established cut-flower-producing operations to supplement their purchases from other domestic producers, shippers, wholesalers, and importers.

For several decades, especially in California, growers have used flower auctions to sell directly to retail florists.[26] Through the auction system, retail outlets bypass the wholesaler. In this environment, retailers make decisions based on economic considerations and can receive a price based on the cost of production, shipping, and other direct costs. The online grower auction is a relatively recent phenomenon. Business to business commerce over the Internet, which is an increasingly important factor in business relations across industries, is successfully uniting flower growers, brokers, retailers, hard goods suppliers, seed companies, and retailers.

Although some retailers source product through the auctions, the majority still find the services a wholesaler provides to be extremely valuable.[27] Wholesalers are generally able to provide the following types of services to retailers: meeting growers/importers minimum orders; dealing with large consolidated bulk shipments; keeping perishable goods refrigerated; replacing inferior products quickly and easily; and dealing with product credit issues of overseas suppliers. Some wholesalers may even provide extended credit to their retail customers who may periodically experience financial distress and have to slow or cease

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[22] Red Kennicott, "Wholesale Changes," *Greenhouse Grower*, Fall 1999.
[23] "The Changing Floriculture Industry," Society of American Florists, June 2001.
[24] Charles Kremp, "Retail Florists Blossom," *Greenhouse Grower*, Fall 1999.
[25] "The Changing Floriculture Industry," Society of American Florists, June 2001.
[26] Red Kennicott, "Wholesale Changes," *Greenhouse Grower*, Fall 1999.
[27] "The Changing Floriculture Industry," Society of American Florists, June 2001.

payment.[28] Most retailers prefer to deal with an intermediary when purchasing product grown overseas as well, since they do not generally have the time or expertise to deal with trade credits, quality guarantees, freight, brokers' fees, and duties, or to identify reliable supply sources.

Several unsuccessful attempts were made in the late 1990s by private equity firms to consolidate multiple firms in different industry segments and take the new companies public.[29] These firms intended to streamline the wholesale distribution of flowers by consolidating a number of smaller flower growing operations, importers, brokers, bouquet manufacturers, and wholesalers. Executives involved in the failed mergers cited pricing pressure from imports in the late 1990s, in light of already thin margins on floral products, as one of the main reasons for the consolidations' failure, in addition to the fact that the cut flower industry is highly fragmented with different segments maintaining distinct inventory management systems and business practices.[30]

Globalization in the Cut Flower Industry

Producers of cut flowers generally are not integrated with foreign firms. There is little direct foreign ownership of U.S. cut flower firms, and few U.S. cut flower producers operate abroad. One exception is a large U.S. multinational firm that recently acquired 790 hectares of farms in cut flower production in Colombia, Ecuador, and Mexico. The company owns its own aircraft service that transports flowers from locations in Latin America to its recently constructed, 328,000-square-foot processing, warehousing, and shipping facility in Miami. This producer serves as grower, importer, marketer, and distributor. The vertical integration of its logistics and handling operations represent its effort to deliver uniform product quality from the farm to its final customers.[31]

Although this type of large-scale operation and investment is not typical in the industry, many overseas producers in Latin America are focusing on establishing supply relationships with U.S. mass merchandisers. Once these connections are established, the mass retail outlet often takes an active role in the production decisions at the grower level. In a relationship of this type, the grower produces to customer specifications, losing some control of his operations; however, his product is guaranteed a venue for sale in the U.S. market where demand is high.

[28] Ibid.
[29] Delilah Onofrey, "Courting Consolidation," *Greenhouse Grower*, Fall 1999.
[30] "Fading fortune," *Latin Trade*, July 2001.
[31] "Industry News," *Floral Management*, Society of American Florists, Mar. 2002.

Marketing Methods

Cut flowers are promoted generically through industry associations and other voluntary organizations. The Society of American Florists (SAF) administrates the Floral Marketing Council (FMC), the largest voluntary public relations program for flowers and plants in the United States. FMC receives contributions from all industry segments. Floral wire services, such as Florists' Transworld Delivery (FTD) and Teleflora, are networks of worldwide florists who have agreed to exchange out-of-town flower orders placed by telephone or over the Internet. These organizations also conduct national advertising campaigns. U.S. and Colombian growers promote flowers in the United States market through the Flower Promotion Organization, a voluntary arrangement they formed to boost short-term and long-term demand for flowers.[32]

A mandatory national marketing effort, similar in structure to national promotion orders for other commodities, was developed in the mid-1990s, but was terminated shortly after its institution. The grower-funded program, in which assessments of 0.5 percent of gross sales were to generate $10-12 million for promotional activities, was formally organized in 1996. USDA handled the administration and collection of the program until it lost the support of the growers and was dismantled in 1997.[33]

In some cases, dried and preserved flowers may be promoted and marketed along with fresh cut flowers in a general "gift item" categoryHowever, customers do not generally perceive fresh and preserved flowers to be substitutable due to the perishable nature of fresh flowers. Floral decorations made of silk and other, synthetic, materials compete more directly with preserved flowers.

Retail marketing of fresh cut flowers has shifted from a large number of small, independent retail florists to florist chains and mass market retailers with garden centers. The entrance of mass merchandisers, or "big box" stores, to the distribution of fresh cut flowers, as well as other garden products, has greatly influenced the change in marketing practices in the industry.

Mass merchandisers are typically discount clubs, home improvement chains, and supermarkets. These stores are typically strategically located, aggressively advertised, and have high customer traffic. Under the influence of mass merchandisers, the marketing of fresh cut flowers has moved from a product and sales orientation to a customer-driven, market-oriented approach. In turn, the concept of strict inventory management and tracking of consumer sales (done through UPC labeling, data captured through point-of-sale registers, and electronic data interchange), perfected by mass merchandisers, has begun to pervade the rest of the retail flower industry; independent retailers and suppliers have begun to adopt these technologies.[34] As mentioned above, a key aspect of the mass merchandisers' typical business model, the notion that low prices move large quantities of merchandise, gives them the ability to exert control over their suppliers. The "big box" stores also need suppliers with

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[32] Flower Promotion Organization fact sheet, ASOCOLFLORES, Association of Colombian Flower Exporters, found at *http://www.asocolflores.org/promo/Art%EDculo%20N%B01.pdf*, retrieved July 3, 2002.

[33] Delilah Onofrey, "Promotion Commotion," *Greenhouse Grower*, Fall 1999.

[34] Stan Pohmer, "Mass Market Acceleration," *Greenhouse Grower*, Fall 1999.

sufficient production capabilities to satisfy their needs. This has contributed to consolidation within the cut flower industry.

Pricing Practices

Market prices for cut flowers are sensitive to demand as well as supply conditions.[35] Although there has been some shift from retailer dependence on holiday promotions to year-round sales, prices for cut flowers tend to be high around certain holidays when demand peaks. Supplies are determined by growers' strategic planting and pinching schedules as well as the weather. When peak production does not coincide with peak demand, prices fluctuate. Certain physical characteristics, such as stem length, color, appearance, and freshness, are also important in establishing prices for cut flowers.

The large purchasing power of mass merchandisers, as well as large importers and distributors, is an important factor in the determination of cut flower prices. This, in addition to low-priced imports, has kept fresh cut flower prices low.[36] Smaller importers and U.S. growers have seen their profit margins decrease significantly as a result. Large growers may be able to maintain profits by negotiating volume discounts with their shippers and reducing other costs. Their cost-cutting strategies may include the development of more productive flower varieties by breeders, particularly in the 40- and 50- centimeter lengths destined for the mass markets; increasing volume to reduce costs per stem; and introducing more efficient management practices.[37]

Research and Development

Many concepts and technologies still used today in the cut flower industry were developed in the 1950s and 1960s, such as artificial soil mixes, individual plug propagation (made possible by the introduction of plastics), and mechanization in the greenhouse.[38] More recently, the industry has incorporated advances such as the use of sophisticated computers for lighting and heating, better control of diseases, hydroponic (soilless) production, improved transportation, and biotechnology. Advances in molecular biology help cut flower growers understand how plant genes and chemical pathways in plants determine quality characteristics. Breeders can patent this knowledge and recoup research and development costs.

Expenditures on research and development in the cut flower industry are carried out by several organizations. Endowments have long provided private sources of funds for research and educational programs. The American Floral Endowment allocates approximately

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[35] Debbie Hamrick, "Is Floriculture Recession-proof?" *FloraCulture International*, retrieved from *www.floricultureintl.com* on Oct. 28, 2002.

[36] Nancy Laws, "World Commerce in Cut Flowers and Roses," *FloraCulture International*, retrieved from *www.floricultureintl.com* , on Oct. 31, 2002.

[37] Ibid.

[38] Thomas Weiler, "Cutting in on History," *Greenhouse Grower*, Fall 1999.

$1 million annually for programs in floriculture and environmental horticulture.[39] In 2000, the Floriculture Industry Research and Scholarship Trust (FIRST) awarded more than $150,000 in scholarships and research grants to improve the production and marketability of flowers and plants.[40] SAF's American Florist Marketing Council also conducts research and marketing promotions on fresh cut flowers.

U.S. MARKET

Consumer Characteristics and Factors Affecting Demand

In the 1960s, cut flower consumers in the United States had little more to choose from than chrysanthemums, gladioli, roses, and standard carnations. Today, with the elimination of constraints on the ability to ship flowers and available transportation, there is an almost unlimited variety of cut flowers available for purchase in the U.S. market.

Most consumers make floral purchases at either a florist shop or supermarket.[41] These two channels support about three-fourths of all cut flower transactions. In the 1990s, supermarkets and discount chains gained importance as retail outlets for cut flowers, primarily due to price and convenience, as traditional floral shops lost sales.[42] Purchases of preserved floral products generally take place at discount chains and craft/hobby stores. Consumers are increasingly making their fresh cut flower purchases online, and the vast majority of these purchases are floral arrangements. Although Internet sales may represent a relatively small share of total purchases, it is becoming an increasingly popular venue for floral sales.[43]

Fresh cut flower consumption tends to be seasonal and peaks around certain holidays. Sales also depend on consumer optimism and price. Industry research on cut flower buying practices has shown that a "heavy buyer" (repeat customer) of fresh cut flowers tends to be middle-aged, and most likely an "empty-nester" whose children have left home to start their own families. Heavy buyers generally come from affluent households and are most likely to be found in the New England and Mid-Atlantic regions of the Eastern United States, and the Mountain and Pacific regions of the West. More than 50 percent of floral product purchases are for gifts.[44]

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[39] American Floral Endowment website at *www.endowment.org/contributions.htm*, retrieved Jan. 2003.

[40] "FIRST Cultivating Progress, " retrieved at *www.firstinfloriculture.org* on Jan. 2003.

[41] "Customer Targeting," American Floral Endowment, found at *http://www.endowment.org/specialreports/marketing.htm*, retrieved Aug. 23, 2002.

[42] Ibid.

[43] *Flora-Stats Annual Report*, American Floral Endowment, 1999.

[44] Ibid.

Consumption

In 2001 apparent consumption of cut flowers was estimated to be $950 million, representing a decline of 6.6 percent from the level in 1997. U.S. production decreased by 10 percent over the period. Exports similarly declined by 19 percent. U.S. imports remained relatively stable throughout the period, rising slightly (by 3 percent) between 1997-1998 and 1999-2000 and ending the period down by 5 percent from the 1997 level (table 2).

Table 2
Cut flowers: U.S. production, exports of domestic merchandise, imports for consumption, and apparent consumption, 1997-2001

Year	U.S. production[1]	U.S. exports	U.S. imports	Apparent U.S. consumption	Ratio of imports to apparent consumption
	Value *(1,000 dollars)*				*Percent*
1997	471,569	48,753	595,045	1,017,861	58.5
1998	411,595	44,553	614,362	981,404	62.6
1999	431,624	41,354	591,593	981,863	60.3
2000	429,963	39,500	611,255	1,001,718	61.0
2001	424,256	39,434	565,471	950,293	59.5

[1] Production of fresh cut flowers. Data for preserved are not available.

Source: Production compiled from official statistics of the U.S. Department of Agriculture; exports and imports compiled from official statistics of the U.S. Department of Commerce.

Strong economic indicators in the United States in the first half of the 1990s, marked by steady growth of GDP, low unemployment, low inflation, increasing wages, and general optimism relating to the stock market, kept cut flower sales steady and prices relatively strong.[45] Since cut flower purchasing is discretionary and tends to be tied to the economy, consumer confidence had a positive influence on cut flower sales.[46] As economic activity slowed starting in 2000, U.S. consumers cut back on their purchases of floral products, especially green plants, cut flowers, and preserved products. Data show that apparent consumption remained steady from 1997-2000 at about $1 billion, then dropped by about $50 million in 2001 (table 2).

The ratio of imports to apparent consumption remained relatively steady between 1997 and 2001 ranging from 59 percent to 63 percent. The main sources for imports during the period were Colombia, Ecuador, and the Netherlands. Imported flowers are considered to be of high quality. Prices on high volume imports, especially roses and chrysanthemums, are generally more cost competitive than domestic products due to low wage rates, smaller climate-control investments, and weaker currencies in Colombia and Ecuador, the chief U.S. suppliers.[47]

[45] "Consumer Tracking Study," *Flora-Stats Annual Reports*, 1993-1999. American Floral Endowment, *www.endowment.org/florastats*, retrieved Sept. 2002.

[46] Debbie Hamrick, "Is Floriculture Recession-proof?" *FloraCulture International*, Apr. 2002

[47] USDA, ERS, *Floriculture and Nursery Crops Situation and Outlook Yearbook*, FLO-2002, May 2002.

Production

In the last two decades, production of certain cut flowers for the U.S. market has moved overseas. Sales by U.S. fresh cut flower growers, except in Western States, have fallen to about one-half their 1992 levels, with the prices of imports falling at a much faster rate. Current prices of domestically grown cut flowers are only 2 percent higher than they were in the early 1990s (less than general consumer price inflation)Prices of imports, however, have dropped by 36 percent over the same period. This has left current overall prices of fresh cut flowers in the U.S. market 15 percent below their levels in 1995.[48]

In the face of increasing low-priced import competition, many U.S. growers have shifted production into specialty cut flowers (which generally refers to flowers other than carnations, chrysanthemums, gladioli, or roses), which are not imported in significant volumes, and also into other floriculture crops such as bedding and garden plants, which are not covered in this summary. Some U.S. growers have differentiated their product to some extent by offering services not available from importers, such as quick turnaround times on special orders.

Table 3 shows data on U.S. production, by type, for the last 5 years. During the period, the value of U.S. production of fresh cut flowers overall decreased by nearly 10 percent. Roses had the most dramatic decrease, falling by almost half. Between 2000 and 2001, decreases were recorded for the value of U.S. production of all flower types, including "other cut flowers," with the exception of lilies and lisianthus.[49]

U.S. TRADE

Overview

The United States maintains a trade deficit in cut flowers with the vast majority of its trading partners with the exception of Canada. The U.S. trade surplus with Canada increased by 42 percent between 1997 and 2001 (table 4)The overall U.S. deficit narrowed between 1997 and 2001, falling from $546 million to $526 million, primarily due to the decrease in value, although not necessarily volume, of imports. The United States is a net importer of flowers because its foreign competition has a competitive advantage in terms of the costs of labor, land and environmental protections.

[48] USDA, ERS, *Floriculture and Nursery Crops Outlook*, Sept. 2002.

[49] USDA altered its Ornamental Crops data set significantly in 1999 and 2001. In 2001 USDA created a category for all roses and six new product categories that had previously been reported under "other flowers." No comparative information is available for additional individual flower types for the entire 5-year period.

Table 3
Fresh cut flowers: U.S. production, by major flower types, 1997-2001

Flower type	1997	1998	1999	2000	2001
	Value *(1,000 dollars)*				
Roses[1]	122,515	102,365	87,003	69,294	67,656
Lilies	([2])	([2])	([2])	55,975	57,452
Tulips	([2])	([2])	([2])	26,760	26,265
Gladioli	34,861	33,138	25,535	28,339	24,183
Iris	([2])	([2])	([2])	20,395	20,117
Gerbera daisy	([2])	([2])	([2])	20,886	20,045
Snapdragons	([2])	([2])	([2])	19,166	17,249
Pompon chrysanthemums	16,341	16,828	15,181	17,214	16,578
Delphinium and larkspur	([2])	([2])	([2])	10,955	10,807
Lisianthus	([2])	([2])	([2])	6,891	10,101
Other cut flowers [3]	297,852	259,264	303,905	154,088	153,803
Total	471,569	411,595	431,624	429,963	424,256

[1] Data for 1997-1999 were collected for two categories of roses only: hybrid tea and sweetheart; 2000 and 2001 data were collected for “all roses”.

[2] Data were not collected separately for this category during 1997-1999; production was included in “other cut flowers.”

[3] Data for 1997-1999 are not comparable with 2000-2001; 2000 and 2001 data collection excluded additional individual flower breakouts which had formerly been in this category.

Note.—Data are for production in 36 major producing States and represent only growers with sales of $100,000 or more.

Source: Compiled from official statistics of the U.S. Department of Agriculture.

Table 4
Cut flowers: U.S. exports of domestic merchandise, imports for consumption, and merchandise trade balance, by selected countries, 1997-2001[1]

	1997	1998	1999	2000	2001
	Value *(1,000 dollars)*				
U.S. exports of domestic merchandise:					
Colombia	159	461	247	205	72
Ecuador	4	213	183	0	331
Netherlands	5,426	1,061	487	422	217
Mexico	9,515	7,145	5,830	4,659	3,113
Canada	23,174	24,805	26,252	27,969	29,757
Costa Rica	3	20	26	12	7
Israel	103	8	58	0	0
Chile	36	71	36	4	0
Guatemala	29	129	0	6	12
New Zealand	3	18	16	6	0
All other	10,301	10,620	8,219	6,218	5,924
Total	48,753	44,553	41,354	39,500	39,434
U.S. imports for consumption:					
Colombia	359,620	360,626	343,127	347,912	302,412
Ecuador	83,497	90,119	92,174	89,350	99,745
Netherlands	61,774	69,200	61,629	71,628	67,097
Mexico	23,649	25,186	27,200	29,633	29,421
Canada	14,871	15,554	15,434	17,816	17,953
Costa Rica	17,974	18,993	19,378	19,429	14,705
Israel	3,832	4,468	4,345	5,818	6,891
Chile	1,402	2,321	3,024	2,920	3,396
Guatemala	7,998	7,397	5,621	5,506	3,373
New Zealand	1,668	2,078	2,261	2,420	3,165
All other	18,760	18,421	17,400	18,824	17,312
Total	595,045	614,362	591,593	611,255	565,471
U.S. merchandise trade balance:					
Colombia	-359,462	-360,165	-342,881	-347,707	-302,340
Ecuador	-83,493	-89,906	-91,991	-89,350	-99,414
Netherlands	-56,348	-68,139	-61,142	-71,206	-66,879
Mexico	-14,134	-18,042	-21,370	-24,974	-26,308
Canada	8,302	9,252	10,818	10,154	11,804
Costa Rica	-17,971	-18,972	-19,353	-19,417	-14,698
Israel	-3,729	-4,459	-4,287	-5,818	-6,891
Chile	-1,366	-2,249	-2,988	-2,916	-3,396
Guatemala	-7,969	-7,268	-5,621	-5,500	-3,361
New Zealand	-1,665	-2,060	-2,245	-2,414	-3,165
All other	-8,459	-7,801	-9,181	-12,606	-11,388
Total	-546,293	-569,809	-550,239	-571,754	-526,037

[1] Import values are based on customs value; export values are based on f.a.s. value, U.S. port of export.

Source: Compiled from official statistics of the U.S. Department of Commerce.

U.S. Imports

Virtually no fresh cut flowers were imported into the United States prior to 1960. At that time, it was difficult to transport perishable products such as flowers over long distances and large-scale production of cut flowers largely was limited to the United States and Europe. In the mid-1960s researchers at Colorado State University identified Bogota, Colombia, as the ideal place in the Western Hemisphere to cultivate standard carnations due to excellent year-round growing conditions, favorable wage rates, and relatively low investment costs. At about the same time, first generation jet aircraft such as the Boeing 727 were becoming too inefficient for use in passenger travel and their freight rates were reduced for use as cargo

planes. These factors, along with the cooperation of the local government in Bogota, led to the development of the export-oriented cut flower industry in Colombia.[50] Similarly, governments in Africa, Asia, and other Latin American countries have encouraged flower industries in their countries as a mechanism to employ large numbers of semiskilled workers and to attract U.S. dollars to their economies.[51] By the early 1980s, offshore cut flower production began to overtake U.S. domestic production, particularly of chrysanthemums, carnations, and roses. Greater supplies of cut flowers at ever lower prices also had the effect of increasing the overall demand for cut flowers in the U.S. market.

Import Levels and Principal Suppliers

As shown in table 5, imports of fresh cut flowers decreased irregularly between 1997 and 2001, but stayed in the range of $550-$600 million (table 5). Although import value fell between 2000 and 2001, the volume of fresh cut flower imports actually increased, albeit at reduced prices, due to high levels of global production.[52] The U.S. economy was generally sluggish in 2001, causing the sales value of fresh cut flowers in the United States to stagnate, reflecting demand sensitivity to increased unemployment and weak economic activity.[53]

Table 5
Fresh cut flowers: U.S. imports for consumption, by principal sources, 1997-2001

Source	1997	1998	1999	2000	2001
	Value *(1,000 dollars)*				
Colombia	359,584	360,576	342,755	347,749	302,321
Ecuador	83,378	89,967	91,900	89,216	99,554
Netherlands	58,762	66,327	59,495	70,503	66,633
Mexico	16,479	17,901	18,437	21,618	21,056
Canada	14,156	14,928	14,935	16,949	17,549
Costa Rica	17,963	18,946	19,284	19,392	14,695
Israel	2,329	3,081	3,040	4,730	6,088
Chile	1,402	2,247	3,003	2,881	3,396
Guatemala	7,951	7,316	5,576	5,458	3,320
New Zealand	1,633	2,056	2,243	2,420	3,165
All other	15,575	15,558	13,547	14,614	13,405
Total	579,212	598,903	574,215	595,530	551,182

Note.— Because of rounding, figures may not add to the totals shown.

Source: Compiled from official statistics of the U.S. Department of Commerce.

[50] Win Winogrond, "Cut Flowers on the Move," *Greenhouse Grower*, Fall 1999.

[51] "The Changing Floriculture Industry," Society of American Florists, June 2001.

[52] USDA, *Ornamental Crops Report, Fruit and Vegetable Market News*, Jan. 2002. USDA data on floral import volumes are not comparable to data compiled by the U.S. Department of Commerce. USDA Ornamental Crops data show a 12.5 percent increase in floral import volume from 2000 to 2001 (3.78 billion stems in 2001 up from 3.36 billion in 2000).

[53] USDA, ERS, Market and Trade Economics Division, *Floriculture and Nursery Crops Situation and Outlook Yearbook*, FLO-2002, May 2002.

The main sources for imports during the period were Colombia, Ecuador, and the Netherlands. Imports from Colombia are valued at over three times those of the next largest importing country, Ecuador. The value of imports from Colombia decreased significantly between 1997-2001, by 16 percent, while imports from Ecuador rose by 19 percent, with the most significant increase between 2000 and 2001 when Ecuadorian growers began to market roses aggressively in the U.S. market.[54] Imports from the Netherlands increased irregularly, ending the period 13 percent above the level in 1997. U.S. imports of preserved flowers have decreased irregularly since 1997, falling by 10 percent during the period (table 6). The major supplier to the U.S. market is Mexico, accounting for more than one-half of the value of imports. China has also become an increasingly important supplier of preserved flowers.

Table 6
Preserved flowers: U.S. imports for consumption, by principal sources, 1997-2001

Source	1997	1998	1999	2000	2001
	Value *(1,000 dollars)*				
Mexico	7,170	7,286	8,763	8,015	8,365
China	355	677	1,695	1,411	1,348
Sri Lanka	87	0	3	649	845
Israel	1,503	1,386	1,305	1,088	804
India	1,124	815	635	670	799
Netherlands	3,013	2,873	2,134	1,125	463
Canada	716	626	499	867	404
France	277	216	378	441	207
Ecuador	118	151	274	134	191
South Africa	147	211	180	191	146
All other	1,324	1,217	1,511	1,134	718
Total	15,833	15,459	17,378	15,724	14,289

Note.—Because of rounding, figures may not add to the totals shown.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Fresh cut flowers are a major nontraditional agricultural export product for both Colombia and Ecuador. Ecuador, like Colombia, enjoys year-round production and benefits from abundant water, labor, and quality land. The United States is the principal fresh-cut flower export market for both these Andean countries,[55] accounting for 82 percent of the total value of Colombian cut flower exports ($580.7 million) and 72 percent of Ecuadorian cut flower exports ($154.7 million) in 2000.[56]

The most important imported flower, in terms of value, is the rose, accounting for 36 percent of all cut flower imports in 2001 (table 7). Carnations (both standard and miniature) are the second-most- imported flower, followed by pompon chrysanthemums.

[54] Staff interview with Jim Wanko, President, Wholesale Florist and Florist Supplier Association, June 25, 2002.

[55] As beneficiaries of the Andean Trade Preferences Act, these countries' imports of cut flowers are entitled to preferential rates of duty. See "U.S. Trade Measures" below.

[56] United Nations Statistical Office, Comtrade Data Base System.

Table 7
Cut flowers: U.S. imports for consumption, by major types, 1997-2001

Flower type	1997	1998	1999	2000	2001
	Value *(1,000 dollars)*				
Pompon chrysanthemums	66,732	73,023	67,298	61,940	50,622
Standard carnations	79,504	74,559	70,597	57,111	44,810
Miniature carnations	37,751	38,740	41,058	34,153	26,526
Alstroemeria	([1])	([1])	26,738	19,367	23,645
Gypsophila	([1])	([1])	22,206	21,037	21,867
Preserved flowers	15,833	15,459	17,378	15,724	14,289
Spray roses	([1])	([1])	4,027	5,406	5,798
Sweetheart roses	1,375	1,565	1,933	1,309	942
Other roses [2]	205,220	215,951	194,886	206,286	198,955
Other fresh cut flowers	188,632	195,064	145,471	188,920	178,016
Total	595,045	614,362	591,593	611,255	565,471

[1] Category not broken out prior to 1999.
[2] 1997 and 1998 data includes spray roses; 1999-2001 data do not include spray roses.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Logistics

Flowers imported from overseas remain fresh by employing a "cold-chain" of distribution, meaning the product is shipped in an unbroken refrigerated chain from grower to importer to floral wholesaler to retailer, providing the flowers with controlled temperature, humidity, and atmospheric conditions. Flowers generally arrive by air from overseas producers and are unloaded from airline cargo holds to refrigerated cooling facilities on the airport premises. Once inspected by USDA and released by U.S. Customs, they travel to importers' facilities where they are re-cooled. Cold air is drawn through the shipping cartons to remove warm air that accumulates inside due to the flowers own respiration and outside temperature changes. The temperature of the flowers is brought down to hibernation level ranging from 32 to 38 degrees Fahrenheit. The flowers are then sorted and loaded onto refrigerated trucks or air carriers for transport to final destinations.

U.S. Trade Measures

Tariff Measures

Table 8 shows the column 1 rates of duty, as of January 1, 2002, for the articles included in this summary (including both general and special rates of duty) and U.S. exports and imports for 2001. An explanation of tariff and trade agreement terms is shown in appendix A. The aggregate trade-weighted average rate of duty for all products covered in this summary, based on 2001 imports and 2001 duty rates, was 1.1 percent ad valorem; the average trade-weighted rate of duty for the dutiable products was 6.3 percent.

Table 8
Cut flowers: Harmonized Tariff Schedule subheading; description; U.S. col. 1 rate of duty as of Jan. 1, 2002; U.S. exports, 2001; and U.S. imports, 2001

HTS subheadings	Description	Col. 1 rate of duty as of Jan. 1, 2002 General	Special [1]	U.S. exports, 2001	U.S. imports, 2001
				——— 1,000 dollars ———	
	Cut flowers and flower buds of a kind suitable for bouquets or for ornamental purposes, fresh, dried, dyed, bleached, impregnated or otherwise prepared:				
	Fresh:				
0603.10.30	Miniature (spray) carnations	3.2%	Free (A,CA,E,IL,J,JO,MX)	31,274 [2]	26,526
0603.10.60	Roses	6.8%	Free (CA,D,E,IL,J,JO,MX)	([2])	205,695
0603.10.70	Chrysanthemums, standard carnations, anthuriums and orchids	6.4%	Free (A*,CA,E,IL,J,JO,MX)	([2])	110,056
0603.10.80	Other	6.4%	Free (A,CA,E,IL,J,JO,MX)	([2])	208,905
0603.90.00	Other	4%	Free (A,CA,E,IL,J,JO,MX)	8,160	14,289

[1] Programs under which special tariff treatment may be provided, and the corresponding symbols for such programs as they are indicated in the "Special" subcolumn, are as follows: Generalized System of Preferences (A); Generalized System of Preferences with the exception of Colombia (A*); North American Free Trade Act (goods of Canada) (CA); African Growth and Opportunity Act (D); Caribbean Basin Economic Recovery Act (E); United States-Israel Free Trade Act (IL); the Andean Trade Preferences Act (J); United States-Jordan Free Trade Area Implementation Act (JO); North American Free Trade Agreement (goods of Mexico) (MX).

[2] Separate export data are not available on an 8-digit level; data reflect all exports of the 6-digit subheading 060310.

Almost 85 percent of total U.S. imports of cut flowers in 2001 entered duty-free under preferential trade programs. More than three-quarters of those imports entered under the Andean Trade Preferences Act (ATPA) that benefits Bolivia, Colombia, Ecuador, and Peru.[57] Imports from Colombia and Ecuador accounted for the vast majority of imports under that program.[58] The second-most-important program with regards to cut flowers is NAFTA; imports from Canada and Mexico combined accounted for almost 10 percent of duty-free cut flower imports in 2001. Small amounts of cut flowers enter under Caribbean Basin Economic Recovery Act (CBERA) (mostly from Costa Rica) and the Generalized System of Preferences (GSP) (mostly from Chile). Israel is a significant world supplier of cut flowers and shipped $6.8 million to the United States in 2001 duty-free under the U.S.-Israel Free Trade Area. Duty-free imports of roses under the African Growth and Opportunity Act (AGOA)[59] program are currently low; however, Kenya is now the leading supplier of roses to Europe and began to ship to the U.S. market under AGOA for the first time in 2001.

Nontariff Measures

Phytosanitary regulations are the only nontariff measure that affects trade in cut flowers. All imported fresh cut flowers are subject to quarantine inspection by the Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture to prevent the spread of injurious plant pests. Most cut flowers do not require a permit, although a certificate of inspection from the country of origin is required for some species.[60] Generally inspectors require that one box of each variety from each grower within a shipment be opened. The inspectors remove the flowers and examine them for any restricted plant pests. Cut flowers found to have any injurious pests are subject to seizure and must be destroyed if they cannot be effectively treated. Such plant material may also be re-exported.

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[57] ATPA was signed into law in December 1991, and renewed in 2002, eliminating or reducing U.S. tariffs on eligible products, including cut flowers, from four Andean countries for the purpose of promoting broad-based economic development in those countries and to develop viable economic alternatives to coca cultivation and cocaine production by offering enhanced access to the U.S. market for Andean products.

[58] Both Colombia and Ecuador are GSP beneficiary countries, however, roses are not included in the GSP program and chrysanthemums are not duty-free under the GSP for Colombia due to the competitive-need-limit requirement. For duty-free treatment, Colombian exporters can ship both roses and chrysanthemums under ATPA only, while Ecuadorian exporters can ship roses under ATPA and chrysanthemums under the ATPA or GSP programs.

[59] The AGOA was signed into law in May 2000, to increase the level of trade and investment between Sub-Saharan Africa and the United States.

[60] One of the most serious diseases that can be introduced on imported flowers is Chrysanthemum white rust. For this reason, chrysanthemums from Mexico and the Netherlands must be accompanied by a phytosanitary certificate and chrysanthemums from Venezuela are prohibited in the United States.

U.S. Government Trade-Related Investigations

Fresh cut flowers, mainly from South America, were the subject of a number of antidumping and countervailing duty investigations during the 1980s and early 1990s. However, the relationship between U.S. and Colombian cut flower producers underwent a significant change in the late 1990s. In 1999, long-standing antidumping duty orders on fresh-cut flowers from Colombia and Ecuador, and a countervailing duty order on pompon chrysanthemums from Peru were revoked as a result of the withdrawal of participation in the proceedings by U.S. domestic interested parties.[61] That same year, U.S. and Colombian cut flower growers and importers reached an arrangement to increase sales of all cut flowers in the United States through the Flower Promotion Organization.

U.S. Exports

Principal Markets and Export Levels

The United States exports cut flowers mainly to Canada, Mexico, the EU, and Japan. U.S. exports of fresh cut flowers fell 5 percent between 1997 and 2001; small but steady increases in exports to Canada offset drops to the Netherlands and Germany during that time (table 9). Exports of preserved flowers showed a steady decline, decreasing 49 percent between 1997 and 2001 (table 10). This was mainly due to the drop in exports of preserved flowers to the principal export market, Mexico. U.S. exports of cut flowers represent a small portion of total U.S. production value as they face intense price competition from low-cost suppliers to the world market.

Table 9
Fresh cut flowers: U.S. exports of domestic merchandise, by principal markets, 1997-2001

Market	1997	1998	1999	2000	2001
	Value *(1,000 dollars)*				
Canada	19,520	21,803	23,653	25,172	27,193
Japan	3,072	2,693	2,680	2,607	2,740
Ecuador	4	209	180	0	331
Russia	136	327	0	0	197
United Kingdom	69	130	280	506	177
Netherlands	5,118	534	321	141	132
Bahamas	12	33	48	48	121
Germany	3,806	3,435	1,757	238	120
All other	1,043	1,548	1,048	572	264
Total	32,780	30,713	29,966	29,285	31,274

Source: Compiled from official statistics of the U.S. Department of Commerce.

[61] 64 FR 28975, May 28, 1999 and 64 FR 48346 and 48347, Sept. 3, 1999.

Table 10
Preserved flowers: U.S. exports of domestic merchandise, by principal markets, 1997-2001

Market	1997	1998	1999	2000	2001
	Value *(1,000 dollars)*				
Mexico	9,397	6,946	5,656	4,651	3,098
Canada	3,654	3,002	2,599	2,797	2,564
United Kingdom	369	442	628	272	554
Japan	619	604	458	490	413
France	20	48	124	0	287
Germany	260	211	217	192	244
Hong Kong	119	67	160	61	199
Italy	132	260	237	104	175
All others	1,403	2,261	1,308	1,648	626
Total	15,973	13,840	11,387	10,216	8,160

Source: Compiled from official statistics of the U.S. Department of Commerce.

Foreign Trade Tariff and Nontariff Measures

The world's largest importers of cut flowers are the United States, the EU (mainly Germany, the United Kingdom, the Netherlands, and France), and Japan.[62] The EU imposes a tariff of 8.5 percent or 12 percent ad valorem on fresh cut flower imports and 10 percent on imports of preserved flowers.[63] Recent changes to phytosanitary regulations for cut flower and plant imports into the EU require certificates to accompany all cut flowers declaring the products free from the relevant quarantine organisms.[64] Imports of all types of cut flowers into Japan are duty free for all countries; however, cut flowers are subject to plant quarantine regulations. U.S. exports of fresh and preserved cut flowers enter Canada duty free under NAFTA. U.S. exporters normally supply over 90 percent of the Canadian import market for roses.[65] U.S. exports captured 13 percent of the Canadian cut flower market for imports in 2001, following Colombia and Ecuador.[66] U.S. exports of cut flowers to Canada do not require an import permit or a phytosanitary certificate.

[62] United Nations Statistical Office, Comtrade Data Base System.

[63] Imports of fresh cut flowers enter the EU with a 12-percent duty from June through October; they are charged an 8.5-percent duty during the rest of the year. Cut flowers from African, Caribbean, and Pacific countries receive duty-free treatment into the EU under the Cotonou agreement.

[64] EU Directive 2000/29/EC had previously required disease-free certification only for cut dianthus, chrysanthemum, and orchid imports. Several amendments to that directive, which will take effect in Apr. 2003, expand the requirement to cover all types of cut flowers.

[65] USDA/FAS, *Canadian Market Brief: Flowers, Plants, Nursery Products*, Apr. 1998.

[66] Global Trade Atlas database for Canada.

FOREIGN INDUSTRY PROFILE

Global Trade and Market Conditions

Although data are not available for world production, the major cut flower producing countries are believed to be the Netherlands, Colombia, and the United States. The main exporting countries are the Netherlands, Colombia, Ecuador, and Israel. Data on world imports of cut flowers indicate the magnitude of the world market, which reached $3.7 billion in 2000. A country's cut flower consumption growth tends to depend on its economic development. The data bears this out, revealing that the world's most wealthy countries consume the most cut flowers. Per capita consumption of cut flowers is highest in Europe, the United States, and Japan. Germany is the largest importer worldwide, receiving about 20 percent of world trade in 2000. The United States imports just slightly less than Germany. The Netherlands is also a large importer, due to the presence of large flower auctions, but it re-exports most of its imports to other countries within the EU.[67] The United Kingdom and Japan are also significant importers. Roses and carnations are the most traded flower types throughout the world.

Prior to the 1970s, the vast majority of world cut flower consumption was supplied by local production. At that time, any international trade in cut flowers was primarily limited to cross border trade. The expanded use of commercial jet aircraft, the establishment of frequent and reliable transoceanic airline service, and the development of sophisticated receiving, handling, and shipping facilities in many countries has allowed for a world market in fresh cut flowers.

Today, the importance of domestic production is generally declining while global imports are increasing. In the 1970s and 1980s, demand for some cut flowers exceeded supply in the world market. At that time, countries in Latin America and Africa ramped up production and created efficient export operations. In the 1990s, worldwide production continued to rise while demand in key markets stabilized or increased only marginally, making trading extremely competitive in most markets. With world production of cut flowers, particularly roses, outpacing demand, average prices fell. Data show that world imports of cut flowers decreased in value by 5 percent between 1997 and 2000 (the most recent year for which data is available), yet at the same time traded volumes increased.[68]

Netherlands

Cut flower production in the Netherlands was valued at $1.8 billion in 2000.[69] Production took place on 8,000 hectares mainly in the Westland region of western Netherlands.[70] More

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[67] More than two-thirds of the international trade in flowers takes place within Europe.

[68] United Nations Statistical Office, Comtrade Data Base System and Laws, Nancy, "World commerce in cut flowers and roses," FloraCulture International, Oct. 31, 2002.

[69] Association of Dutch Flower Auctions (*Vereniging van Bloemenveilingen in Nederland*).

[70] K.V. Peter, "Cut flower market to touch $35 billion," *Asia Intelligence Wire*, Sept. 3, 1999.

than 60 percent of production takes place in greenhouses.[71] Increased competition from low-priced imports has led to consolidation within the industry, resulting in larger farms which can take advantage of economies of scale to increase productivity. The cultivation of flowers and plants accounts for only about 4 percent of horticultural land use in the Netherlands, but it generates about one-half of its production value.[72] The main flower crops are roses, tulips, chrysanthemums, freesias, and gerberas. Dutch producers benefit from fertile soils and a cool and temperate climate, as well as an abundant supply of natural gas to heat their greenhouses.[73]

The Dutch have been growing flowers and plants commercially since the early 1800s. Most growers do not sell their products directly to end users, but are affiliated with the Dutch flower auction system. This system, in place since the early 1900s, serves as a type of growers' co-operative. Once a member of the auction, a grower is obligated to sell all his production there. More than 90 percent of Dutch production, as well as many imports, is sold through the auction system. Today about 15 percent of flowers at the Dutch auctions consist of imports, mostly from Kenya, Colombia, and Israel.[74] Electronic auction sales are becoming increasingly important. Regardless of the form the auction sales take, the auction system is where prices are determined and where the distribution of flowers to both domestic and export markets is organized.

The Netherlands is by far the largest exporter of cut flowers in the world. Dutch exports reached $2.1 billion in 2000, the vast majority of which went to neighboring countries within the European Union, especially Germany, the United Kingdom, and France.[75] Almost 75 percent of all Dutch production is exported.[76] The Dutch accounted for 58 percent of the international cut flower market and 85 percent of the market in the European Union in 2000.[77] Although the Netherlands has more expensive raw materials and labor costs and a less favorable climate for most of the year relative to developing country producers, the Dutch industry is able to remain competitive due to its high productivity, efficiency, and innovation.[78] The Netherlands' success in floriculture can also be attributed to the use of capital intensive technical applications, high quality propagation material, and a highly trained workforce.[79]

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[71] Ibid.

[72] Dutch Product Board for Horticulture, "Dutch Horticulture in Facts and Figures, 2000."

[73] Peter J. Batt, "Strategic Lessons to Emerge from an Analysis of Selected Flower Export Nations," *Journal of International Food and Agribusiness Marketing*, Vol. 11, Nov. 3, 2000.

[74] Ibid.

[75] This figure includes Dutch exports of imported product.

[76] Dutch Ministry of Agriculture, Nature Management and Fisheries, "The Dutch Floriculture Sector," Oct. 2000.

[77] Dutch Product Board for Horticulture, "Dutch Horticulture in Facts and Figures, 2000."

[78] Joanne McIntyre, "Vast European market set to dominate world trade," *Flowertech*, Vol. 2, No. 4, 1999.

[79] Peter J. Batt, "Strategic Lessons to Emerge from an Analysis of Selected Flower Export Nations," *Journal of International Food and Agribusiness Marketing*, Vol. 11, No. 3, 2000.

Colombia

Colombia's fresh cut flower production was valued at approximately $642 million in 2001.[80] Fresh cut flowers were produced on 5,630 hectares in 2001 on more than 500 farms. Most of Colombia's fresh cut flower production is located around Bogota, with small production areas in the Rionegro and Antioquia regions around Medellin and Cali. Roses, standard and miniature carnations, and chrysanthemums account for almost 80 percent of Colombian production and exports. Colombia has ideal growing conditions for cut flowers, abundant labor and land, and high light levels, giving it a production cost advantage over U.S. producers. Relatively low investment costs and a cooperative local government have contributed to the flourishing of Colombia's cut flower industry.

Colombia was the second largest exporter in the world in 2001 and exported about 95 percent of its cut flower production, primarily to the United States and the EU. The Colombian cut flower industry was developed in the late 1960s specifically as an export business, replacing traditional small-scale agricultural production. In 2001, Colombian producers exported more than $610 million worth of flowers. The United States was the destination for about 80 percent of Colombian exports during the period 1997-2001. The EU was the destination for about 12 percent of Colombia's exports. Flowers destined for the United States are transported in 35,000 boxes on 20 daily flights into Miami International Airport. The industry employs approximately 79,000 people directly involved in production and another 75,000 indirectly in shipping, packaging, and other services. The largest cost component of production is labor, representing 30 percent of the cost of the final product. Cut flowers accounted for 5 percent of the value of total Colombian exports and contributed 3 percent to the Colombian gross domestic product in 2001.[81]

Ecuador

Ecuador's fresh cut flower production was valued at approximately $280 million in 2001.[82] In 1998 (the last year for which data are available), fresh cut flowers were produced on 2,700 hectares on 264 farms with 50,000 people involved in direct production operations.[83] Ecuador has ideal weather conditions for flower growing due to its situation on the equator and 12 hours of sunlight year-round. Roses accounted for over one-half of Ecuador's cut flower production.

Exports of fresh cut flowers in 2001 reached $250 million.[84] Traditionally over 90 percent of the country's total cut flower production is exported, mostly to the United States but also to the Netherlands and Russia. In recent years, Ecuadorian producers have lost important markets in Eastern Europe and have increased exports to the United States. Although

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[80] Based on the fact that 95 percent of Colombian production is exported. Association of Colombian Flower Growers (ASCOLFLORES). Presentation to the 53rd Congress of International Association of Horticultural Producers, Bogota, Colombia, Oct. 2001.

[81] Association of Colombian Flower Growers (ASCOLFLORES).

[82] Based on the fact that 90 percent of Ecuadorian production is exported. USDA, U.S. Foreign Agricultural Services, "World Horticultural Trade and U.S. Export Opportunities," Oct. 1996.

[83] EXPOFLORES, Ecuadorian Flower Growers and Exporters Association, "La Flor de Ecuador," Mar. 1999.

[84] "Ecuador assails cuts in U.S. aid," *Los Angeles Times*, June 26, 2002.

Colombia dominates the U.S. market for imports, Ecuadorian producers have recently made significant investments in production facilities, specifically newer plantings of rose bushes, and are therefore able to offer different varieties than their competition[85]Ecuadorian exporters ramped up exports to the U.S. market in 2001. Ecuador has a slight disadvantage relative to Colombia in terms of freight rates; however, Ecuador benefits from lower labor costs relative to Colombia.

Israel

Israeli flower production, which takes place on approximately 2,100 hectares, has been estimated to be worth $185 million in 2001.[86] As in many cut flower producing countries, the area dedicated to cut flower production has been increasing. However, the number of growers is declining and average property sizes are increasing.[87] The main flower types produced are roses and carnations. Most production (about 70 percent) takes place under protective polyvinyl structures to counteract high daytime temperatures, humidity, and low overnight temperatures. Specialized drip irrigation was developed in Israel in the 1950s as a way to deal with the water shortage that affects all sectors of Israeli agriculture.[88] Technical efficiencies, low labor-wage costs, and temperatures generally favorable for plant growth sustain the Israeli floriculture sector.

In 2001, Israel was the fourth-largest exporter of cut flowers in the world, with exports valued at $130 million. The EU is the principal destination for Israeli cut flowers and, in 2001, Israeli imports accounted for 16 percent of the import market for cut flowers in the EU. Israel faces increased competition in supplying Europe with flowers as African countries develop more efficient export operations.

Eastern and Southern Africa: Kenya, South Africa, Zimbabwe

In Eastern and Southern Africa approximately 1,400 growers cultivated 5,500 hectares of flowers and exported approximately 80,000 tons of cut flowers in 2001.[89] In the late 1990s, the floriculture sector grew at an average rate of 10 to 15 percent per year.[90] This development has come as a result of improved logistics, flower quality, and postharvest handling conditions. In addition, several of the key producing countries have been successful in meeting internationally recognized standards of practice regarding safety, wage rates, environmental awareness, and water management.[91] Africa benefits from competitive

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[85] A rose bush may be commercially productive for 6-8 years. Many Colombian growers are working off of existing bushes and offering the same varieties as in previous years.

[86] Communication with Tal Darcherits, Flower Board Israel.

[87] Peter J. Batt, "Strategic Lessons to Emerge from an Analysis of Selected Flower Export Nations," *Journal of International Food and Agribusiness Marketing*, Vol. 11, No. 3, 2000.

[88] In drip irrigation, water is applied directly to the root of the plant using 1/16 of the water of traditional irrigation methods.

[89] Marie-Francoise Petitjean, "Booming floriculture in Africa," *Floriculture International*, June 2002.

[90] Ibid.

[91] "Rosey future for Kenya flowers," *African Business*, Mar. 2002.

production costs and in some cases productivity comparable to other key suppliers to the EU market such as Israel and Latin American countries.[92]

Although the majority of African producing countries are highly dependent on roses, producers in several countries have conducted strategic analyses to diversify production into other flower types and into other types of products, such as ready-made bouquets. However, for the majority of the countries in Africa, it remains a challenge to attract medium and long-term investment funds for the expansion of existing small-scale flower projects.

African growers produce mainly for the European market. Flowers from African, Caribbean, and Pacific countries receive duty-free treatment into the EU under the Cotonou agreement. A proposal has been made to limit duty-free access for flowers to least developed countries when the agreement comes up for renewal in 2007. Under these provisions, Kenya and Zimbabwe, not considered least developed for purposes of the agreement, would have a competitive disadvantage vis-a-vis other African cut flower producers such as Uganda, Tanzania, and Zambia in exporting to the EU.

Kenya, the largest cut flower grower in Africa, produced 41,400 metric tons of fresh cut flowers for export in 2001. Although Kenya has the most diversified production of the African producers, about two-thirds of its exports are roses. Carnations are the second-most-popular flower export. Cut flower production is Kenya's fastest growing sector of the economy and ranks second after tea. Production increased by 22 percent between 1999 and 2000.

Kenyan exports of cut flowers were valued at $91 million in 2000.[93] Improved air-freight capacity and the construction of a modern cargo facility near the Nairobi airport facilitate quick shipment of the vast majority of exports to the EU. Most Kenyan flowers are sold through the Dutch flower auctions, but 15 percent is sold directly to British supermarkets.[94] In 1999, Kenya surpassed Israel to become the largest import supplier of cut flowers to the Dutch auction, and by 2000 captured 28 percent of the EU import market.[95] The high growth in the industry in recent years can be attributed to private sector initiatives, minimal government interference, and liberalization of the economy.[96]

Zimbabwe is the second-most-important African supplier to the EU, and the third-largest overall supplier behind Kenya and Israel in 2000. Farmers traditionally growing maize and tobacco farmers diversified their operations by cultivating 1 to 2 hectares of flowers on their farms. By 2000, 1,150 hectares were devoted to cut flower production with 20,000 tons of exports shipped almost exclusively to the Netherlands and Germany. Roses account for 70 percent of the country's production. Political instability and governmental mismanagement may lower productivity and export potential of the sector. In 2002,

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[92] Marie-Francoise Petitjean, "Booming floriculture in Africa," *Floriculture International*, June 2002, p. 20.

[93] USDA, Foreign Agricultural Service, GAIN Report, "Kenyan Horticultural Situation, 2002." June 20, 2002.

[94] Marie-Francoise Petitjean, "Booming floriculture in Africa," *Floriculture International*, June 2002, p. 17.

[95] Ibid, p. 20.

[96] USDA, Foreign Agricultural Service, GAIN Report, "Kenyan Horticultural Situation, 2002." June 20, 2002.

President Mugabe's government began expropriating farmland, affecting the entire commercial farming sector and making the future of the floriculture industry uncertain.[97]

South Africa has a large number of hectares dedicated to the production of cut flowers that mostly serves the domestic market. The country reported $11.6 million in exports for 2001, with slightly more than one-half shipped to the EU, and the rest to Asia, Australia, and North America.[98] With an additional 189,000 hectares of land available for cultivation, South Africa has enormous potential for increasing cut flower exports and has begun to address relevant considerations for that endeavor such as technology and training, freight, and quality standards.

[97] Marie-Francoise Petitjean, "Booming floriculture in Africa," *Floriculture International*, June 2002, p. 17.

[98] United Nations Statistical Office, Comtrade Data Base System.

APPENDIX A
EXPLANATION OF TARIFFS AND TRADE AGREEMENT TERMS

TARIFF AND TRADE AGREEMENT TERMS

In the ***Harmonized Tariff Schedule of the United States*** (HTS), chapters 1 through 97 cover all goods in trade and incorporate in the tariff nomenclature the internationally adopted Harmonized Commodity Description and Coding System through the 6-digit level of product descriptionSubordinate 8-digit product subdivisions, either enacted by Congress or proclaimed by the President, allow more narrowly applicable duty rates; 10-digit administrative statistical reporting numbers provide data of national interestChapters 98 and 99 contain special U.S. classifications and temporary rate provisions, respectively. The HTS replaced the *Tariff Schedules of the United States* (TSUS) effective January 1, 1989.

Duty rates in the ***general*** subcolumn of HTS column 1 are normal trade relations rates; many general rates have been eliminated or are being reduced due to concessions resulting from the Uruguay Round of Multilateral Trade Negotiations. Column 1-general duty rates apply to all countries except those listed in HTS general note 3(b) (Cuba, Laos, and North Korea) plus Serbia and Montenegro, which are subject to the statutory rates set forth in ***column 2***. Specified goods from designated general-rate countries may be eligible for reduced rates of duty or duty-free entry under preferential tariff programs, as set forth in the ***special*** subcolumn of HTS rate of duty column 1 or in the general notes. If eligibility for special tariff rates is not claimed or established, goods are dutiable at column 1-general rates. The HTS does not list countries covered by a total or partial embargo.

The ***Generalized System of Preferences*** (GSP) affords nonreciprocal tariff preferences to designated beneficiary developing countries. The U.S. GSP, enacted in title V of the Trade Act of 1974 for 10 years and extended several times thereafter, applies to merchandise imported on or after January 1, 1976, and before the close of September 30, 2001. Indicated by the symbol "A", "A*", or "A+" in the special subcolumn, GSP provides duty-free entry to eligible articles the product of and imported directly from designated beneficiary developing countries (see HTS gen. note 4). Eligible products of listed sub-Saharan African countries may qualify for duty-free entry under the ***African Growth and Opportunity Act*** (AGOA) (see HTS gen. note 16) through September 30, 2008, as indicated by the symbol “D” in the special subcolumn; see subchapter XIX of chapter 98.

The ***Caribbean Basin Economic Recovery Act*** (CBERA) affords nonreciprocal tariff preferences to designated developing countries in the Caribbean Basin area. The CBERA, enacted in title II of Public Law 98-67, implemented by Presidential Proclamation 5133 of November 30, 1983, and amended by the Customs and Trade Act of 1990, applies to goods entered, or withdrawn from warehouse for consumption, on or after January 1, 1984. Indicated by the symbol "E" or "E*" in the special subcolumn, CBERA provides duty-free entry to eligible articles, and reduced-duty treatment to certain other articles, which are the product of and imported directly from designated countries (see HTS gennote 7). Eligible products of listed beneficiary countries may qualify for duty-free or reduced-duty entry under the ***Caribbean Basin Trade Partnership Act*** (CBTPA) (see HTS gen. note 17), through September 30, 2008, as indicated by the symbol “R” in the special subcolumn; see subchapter XX of chapter 98.

Free rates of duty in the special subcolumn followed by the symbol "IL" are applicable to products of Israel under the ***United States-Israel Free Trade Area Implementation Act*** of 1985 (IFTA), as provided in general note 8 to the HTS; see also subchapter VIII of chapter 99.

Preferential nonreciprocal duty-free or reduced-duty treatment in the special subcolumn followed by the symbol "J" or "J*" in parentheses is afforded to eligible articles from designated beneficiary countries under the ***Andean Trade Preference Act*** (ATPA), enacted as title II of Public Law 102-182 and implemented by Presidential Proclamation 6455 of July 2, 1992 (effective July 22, 1992–Dec. 4, 2001) (see HTS gen. note 11).

Preferential free rates of duty in the special subcolumn followed by the symbol "CA" are applicable to eligible goods of Canada, and rates followed by the symbol "MX" are applicable to eligible goods of Mexico, under the ***North American Free Trade Agreement*** (NAFTA), as provided in general note 12 to the HTS and implemented effective January 1, 1994, by Presidential Proclamation 6641 of December 15, 1993Goods must originate in the NAFTA region under rules set forth in general note 12(t) and meet other requirements of the note and applicable regulations.

Preferential rates of duty in the special subcolumn followed by the symbol “JO” are applicable to eligible goods of Jordan under the ***United States-Jordan Free Trade Area Implementation Act***, (JFTA) effective as of Dec. 17, 2001; see HTS gen. note 18 and subchapter IX of chapter 99.

Other special tariff treatment applies to particular ***products of insular possessions*** (gen. note 3(a)(iv)), ***products of the West Bank and Gaza Strip*** (gen. note 3(a)(v)), goods covered by the ***Automotive Products Trade Act*** (APTA) (gen. note 5) and the ***Agreement on Trade in Civil Aircraft*** (ATCA) (gen. note 6), ***articles imported from freely associated states*** (gen. note 10), ***pharmaceutical products*** (gen. note 13), and ***intermediate chemicals for dyes*** (gen. note 14).

The ***General Agreement on Tariffs and Trade 1994*** (GATT 1994), pursuant to the Agreement Establishing the World Trade Organization, is based upon the earlier GATT 1947 (61 Stat. (pt. 5) A58; 8 UST (pt. 2) 1786) as the primary multilateral system of disciplines and principles governing international trade. Signatories' obligations under both the 1994 and 1947 agreements focus upon most-favored-nation treatment, the maintenance of scheduled concession rates of duty, and national treatment for imported products; the GATT also provides the legal framework for customs valuation standards, "escape clause" (emergency) actions, antidumping and countervailing duties, dispute settlement, and other measures. The results of the Uruguay Round of multilateral tariff negotiations are set forth by way of separate schedules of concessions for each participating contracting party, with the U.S. schedule designated as Schedule XX. Pursuant to the **Agreement on Textiles and Clothing** (ATC) of the GATT 1994, member countries are phasing out restrictions on imports under the prior "Arrangement Regarding International Trade in Textiles" (known as the **Multifiber Arrangement** (MFA))Under the MFA, which was a departure from GATT 1947 provisions, importing and exporting countries negotiated bilateral agreements limiting textile and apparel shipments, and importing countries could take unilateral action in the absence or violation of an agreement. Quantitative limits had been established on imported textiles and apparel of cotton, other vegetable fibers, wool, man-made fibers or silk blends in an effort to prevent or limit market disruption in the importing countries. The ATC establishes notification and safeguard procedures, along with other rules concerning the customs treatment of textile and apparel shipments, and calls for the eventual complete integration of this sector into the GATT 1994 over a ten-year period, or by Jan. 1, 2005.