Work Package 5 EU-CEG data and enhanced laboratory capacity for regulatory purposes

Descriptive analysis of EU-CEG Data on Tobacco Products at EU Scale

Authors: ANSES
September 2024

Doc. Ref. N°: D5.5
Type: Document (R)
Dissemination: Public (P)

JATC 2 JOINT ACTION ON TOBACCO CONTROL

Co-funded by the European Union's Health Programme under Grant Agreement n°: 101035968 - JA-01-2020 - HP-JA-2020 / HP-JA-2020-2

Version	Date	Authors	Comments
1	12 Sept. 2024	ANSES	First version

Table of contents

Introduction

Manufacturers and importers of tobacco products are required to submit key information about the products they intend to market to the competent authorities of the EU Member States.

Each Member State only receives information relevant to its territory. Therefore, it was worthwhile to leverage this joint action to conduct an analysis of the declarations made across several Member States.

This document presents some descriptive analyses that can be performed using an EU-CEG dataset compiled from multiple countries. These analyses focus on the general characteristics of the products and their composition data.

1 Data sources

The joint dataset was compiled from the publication files shared through MS-Rep according to the process developed in this project (see JATC2 D5.1).

The competent authorities of 12 Member States shared their public data in June 2023. These were the following countries: Belgium (BE), Bulgaria (BG), Czech Republic (CZ), Estonia (EE), France (FR), Italy (IT), Lithuania (LT), Luxembourg (LU), Latvia (LV), Netherlands (NL), Sweden (SE), and Slovenia (SI).

Each national dataset contained two files for tobacco products: one CSV file listing the products (and their presentations) and one CSV file containing composition data (list of ingredients and their quantities).

2 Method

The CSV files were imported into an SQLite database. They underwent a curation process with the addition of information concerning generic ingredients according to a method developed in this project (see JATC2 D5.9).

In the end, two consolidated tables were created: one table with over 60,000 rows containing the list of products (presentations) with an additional column indicating the national market; and one table with over 2,500,000 rows containing the composition data, enriched with ingredient information resulting from the curation process.

These tables were then imported into the R software to perform the analyses and visualizations presented below. The tables resulting from calculations performed in R were exported to Excel for formatting.

3 Product types

Initially, we focused on the general characteristics of the products, particularly their type and the national market for which they were declared.

As agreed within the scope of WP5 of JATC2, we only addressed conventional tobacco products here, namely cigarettes, cigars and cigarillos, rolling tobacco, pipe tobacco, waterpipe tobacco, snuff, and chewing tobacco.

The table below shows the distribution of the number of products by type and by market.

Table. Number of products per national market.

National Market	Chewing tobacco	Cigar	Cigarette	Cigarillo	Nasal tobacco	Pipe tobacco	Roll your own tobacco	Waterpipe tobacco	Total
BE	13	2 574	1 376	728	13	145	1 719	55	**6 623**
BG	0	1 586	1 360	132	8	61	41	799	**3 987**
CZ	58	3 340	4 189	299	120	281	326	1 229	**9 842**
EE	0	1 526	357	43	0	60	63	1 307	**3 356**
FR	9	2 190	4 848	622	8	178	739	693	**9 287**
IT	10	2 438	3 661	343	9	267	311	759	**7 798**
LT	0	959	403	87	1	53	72	715	**2 290**
LU	8	1 267	2 644	164	7	30	781	324	**5 225**
LV	0	648	299	96	0	53	83	246	**1 425**
NL	8	4 372	3 669	469	10	195	1 072	328	**10 123**
SE	40	1 252	556	112	9	107	38	55	**2 169**
SI	46	996	889	28	4	30	57	152	**2 202**
Total	**146**	**22 152**	**23 362**	**3 095**	**185**	**1 430**	**5 245**	**6 510**	**62 125**

The figure illustrates the distribution of tobacco product types across different national markets using pie charts. The size of each pie chart is proportional to the total number of products declared for each market. As such, the most significant markets among the Member States sharing their data are the Netherlands (NL), the Czech Republic (CZ), France (FR), and Italy (IT), which have the largest pie charts.

In contrast, smaller markets, such as Latvia (LV), Lithuania (LT), Sweden (SE), Slovenia (SI), and Estonia (EE), have a smaller number of declared products, as indicated by the reduced size of their pie charts.

Cigarettes (yellow) and cigars (purple) appear to have a dominant share in many of the national markets, such as in the Netherlands and the Czech Republic.

Roll-your-own tobacco (green) and pipe tobacco (orange) also have a visible presence, particularly in Belgium (BE) and France (FR).

This visualization effectively highlights the product distribution and market size, providing a clear overview of which product types are more prevalent in each country.

Another figure below displays the distribution of each tobacco product type across various national markets.

Cigars and cigarettes have a highly diversified distribution across multiple national markets. Cigars show significant presence in Belgium (BE), Italy (IT), France (FR), and the Netherlands (NL), as indicated by the large segments of the corresponding colors. Cigarettes are widely distributed, with notable shares in France (FR), Italy (IT), the Netherlands (NL), and the Czech Republic (CZ).

Roll-your-own tobacco and pipe tobacco are more prevalent in specific markets. Roll-your-own tobacco has strong representation in France (FR), the Netherlands (NL), and Belgium (BE). Pipe tobacco is primarily represented in the Netherlands (NL) and France (FR), with smaller contributions from Belgium (BE) and Italy (IT).

For less common products, such as nasal tobacco and chewing tobacco, the distribution is limited to only a few markets. The small pie charts reflect the lower prevalence of these products, with a clear majority coming from Belgium (BE), France (FR), and the Czech Republic (CZ).

Waterpipe tobacco and cigarillos are also concentrated in a few markets, with France (FR), the Netherlands (NL), and the Czech Republic (CZ) being key contributors.

Figure. Distribution of products by type for each national market.

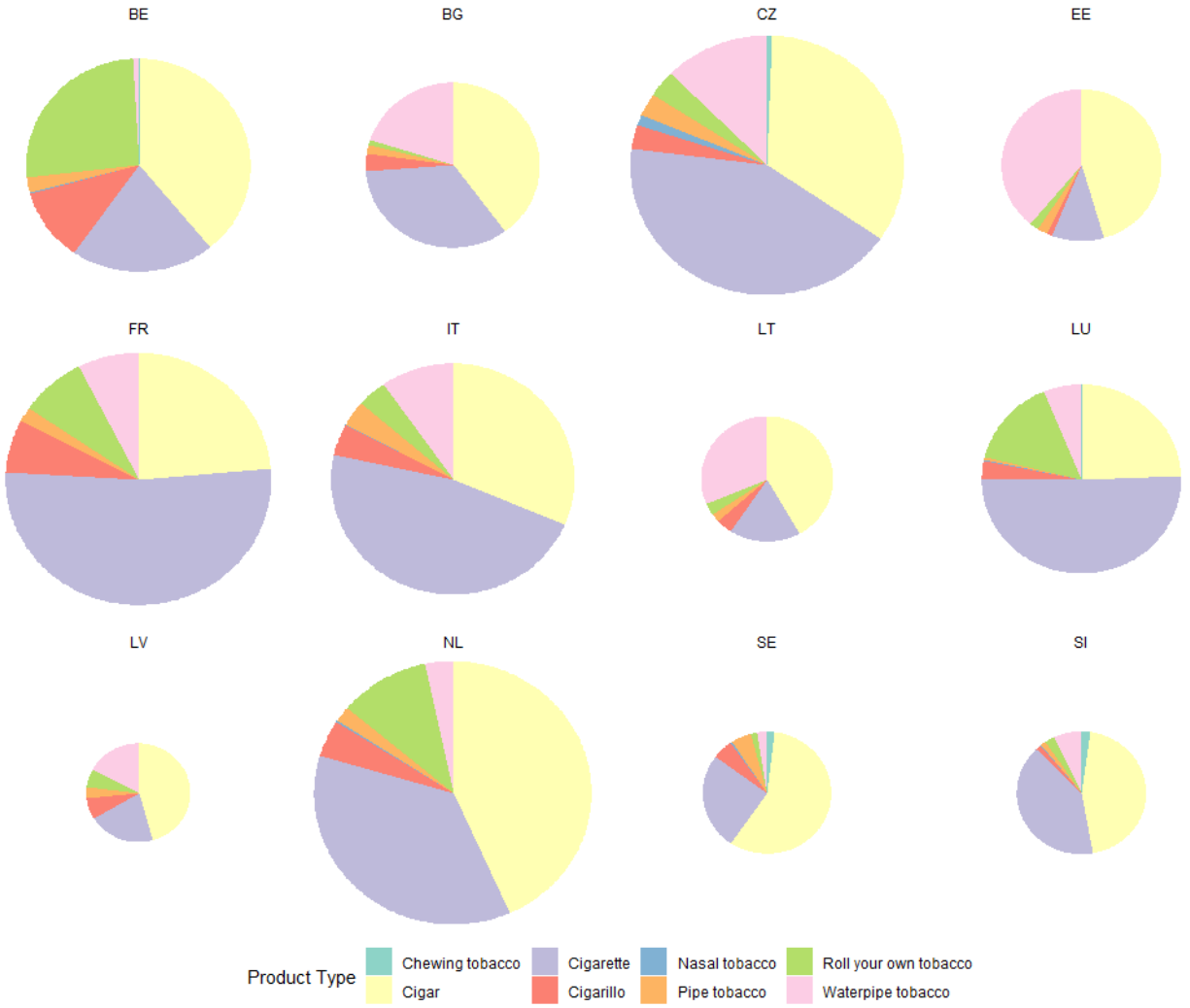


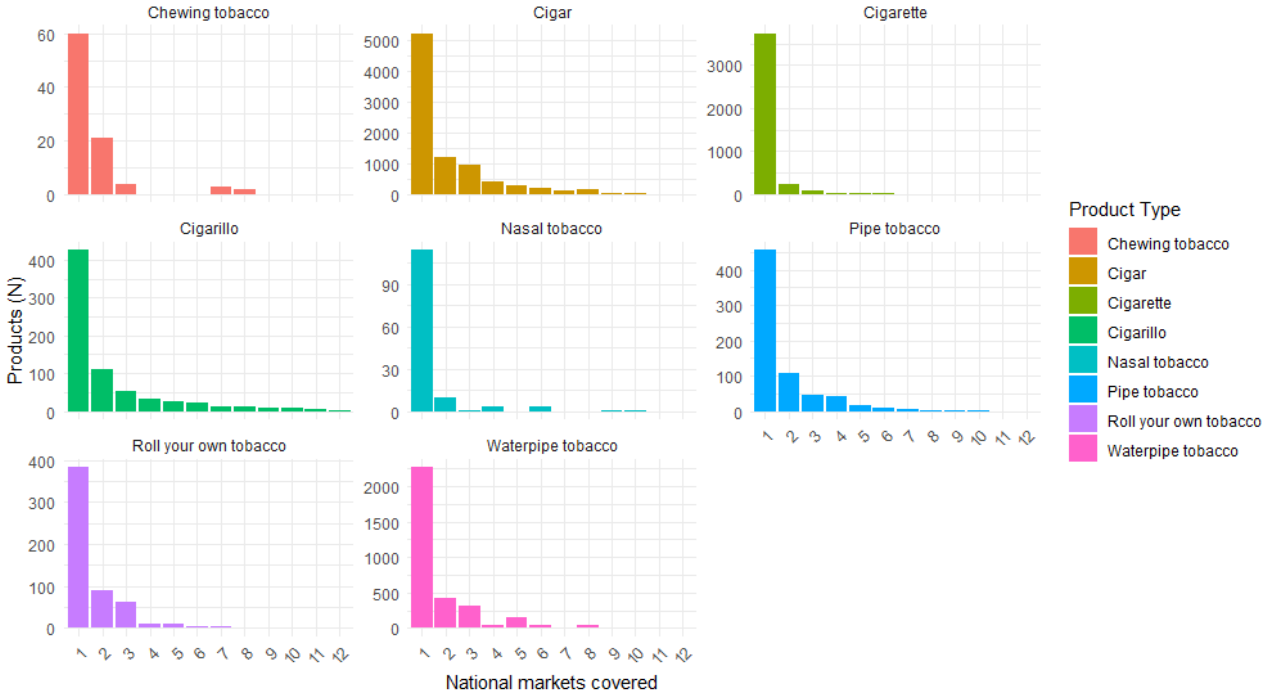
Figure. Distribution of national markets for each product type.

This visualization effectively highlights which national markets have a significant presence of each product type, showing that the distribution varies considerably depending on the product category. It helps identify patterns and focus areas for further analysis based on market and product type segmentation.

4 Multi-market presence

The next two sets of histograms provide complementary insights: the first set shows the distribution of products across multiple markets, while the second set focuses on the distribution of manufacturers for these products.

Figure. Distribution of the number of products present in one or multiple markets.



For most product types (e.g., chewing tobacco, cigarillos, nasal tobacco, and pipe tobacco), both the number of products and the number of manufacturers are predominantly concentrated in only one or two national markets. This suggests that these product types are niche and produced by a limited number of manufacturers, each focusing on a few select markets.

For cigars and cigarettes, the number of manufacturers and products shows a wider spread across multiple markets. However, while cigars have a higher count of products (first figure), the number of distinct manufacturers (second figure) decreases significantly as the number of markets increases. This suggests that some manufacturers have large product portfolios limited to only a few markets.

Cigarettes have a noteworthy distribution, with some manufacturers covering up to 11 markets. This contrasts with the first figure, where the majority of cigarette products are found in just one or two markets. This discrepancy suggests that a few large manufacturers dominate multiple markets with a small set of widely distributed products, while other manufacturers may produce a diverse array of cigarette products limited to specific regions.

Figure. Distribution of the number of manufacturers present in one or multiple markets.

Pipe tobacco and waterpipe tobacco have relatively high manufacturer counts for a few markets, indicating a more localized presence. This could imply specialization, where these manufacturers cater to specific cultural or regional preferences.

Roll-your-own tobacco shows a similar pattern to cigars, where several manufacturers cover up to 12 markets. This multi-market presence for a traditionally niche product suggests an increase in demand or diversification strategies by larger manufacturers.

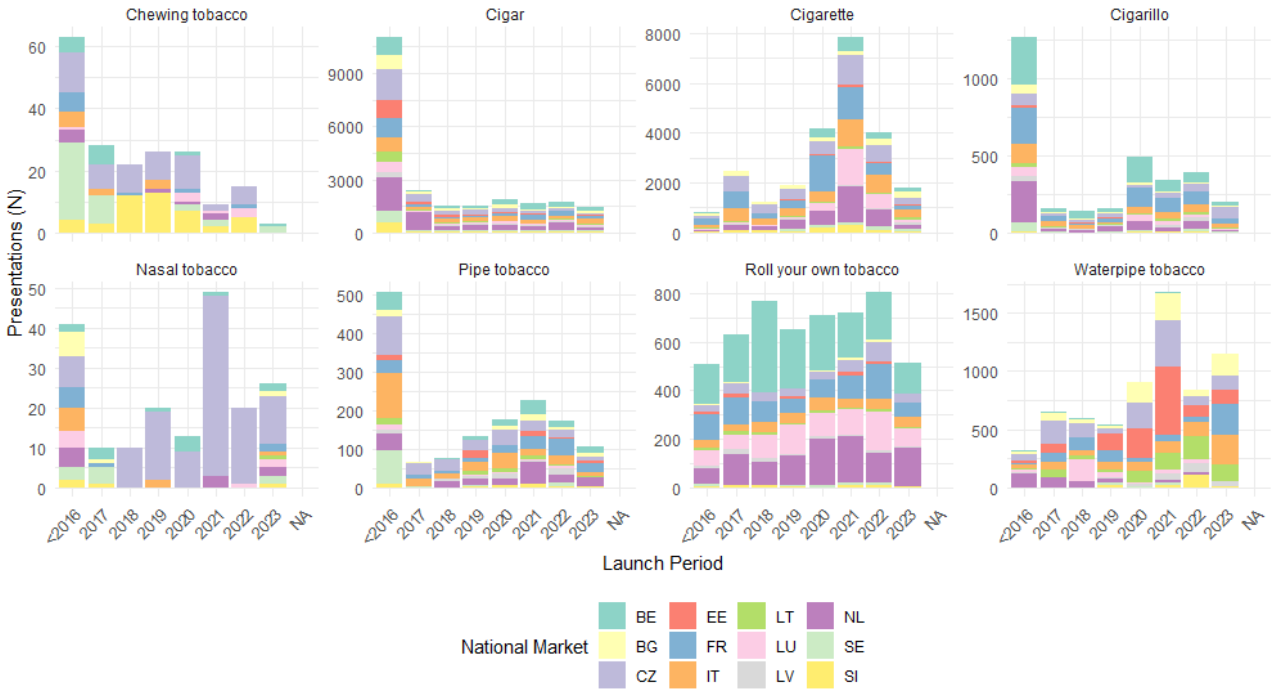
Across product categories, many manufacturers appear to be limited to just one national market (especially for niche products like nasal tobacco and chewing tobacco), emphasizing the localized nature of these products and potential regulatory or consumer preference barriers for expansion.

The general trend shows that the presence of manufacturers declines significantly as the number of markets increases, similar to the drop observed for products in the first figure. This trend indicates that the majority of products are manufactured by companies with a limited geographical footprint, with only a few large manufacturers having a broader market reach.

The combined analysis highlights that for most product types, the market distribution is dominated by a few large manufacturers with extensive reach, while niche products are produced by smaller manufacturers with a focus on specific markets. Cigarettes and cigars are the most distributed product categories, with a relatively small number of manufacturers supplying multiple markets. For other product types, market presence is more limited, driven by localized production and demand.

5 Product launches on the market

Figure. Product launch periods, by type and by national market.



The figure shows the launch periods of various tobacco product presentations, broken down by product type and national market. The bars indicate the number of product presentations introduced in each period, providing insight into the dynamics of market entries over time. Here are some key observations:

For most product categories, a significant number of launches occurred in the periods between 2017 and 2021, after which there is a visible decline in 2022 and 2023.

Cigarettes and cigars show a large surge in launches around 2017–2018, peaking again in 2020, possibly due to regulatory changes (ban of mentholated cigarettes) or shifts in market demand.

Roll-your-own tobacco has a steady increase in launches from 2018 to 2021, indicating growing interest or demand during this period.

The decline in product launches from 2022 onward is notable across all categories. This could be due to several factors, such as stricter regulations, market saturation, or the impact of the COVID-19 pandemic on product development and market entries.

The category of chewing tobacco also shows a drop-off in launches post-2018, indicating a reduction in new products in this niche category.

The national markets with the highest product launches include France (FR), the Netherlands (NL), and Italy (IT), as indicated by their strong representation across all product types. This is consistent with their larger overall market sizes seen in previous visualizations.

In contrast, smaller markets like Latvia (LV), Lithuania (LT), and Slovenia (SI) show limited product introductions over time, suggesting a stable or niche presence for these categories.

Cigarettes show a concentration of launches in a few key years, suggesting periodic spikes rather than steady growth.

Cigarillos and pipe tobacco have a more evenly spread introduction pattern, indicating consistent niche market demand.

Waterpipe tobacco shows an unusual peak in 2020, followed by a sharp decline, which could be linked to temporary market trends or specific regulatory changes.

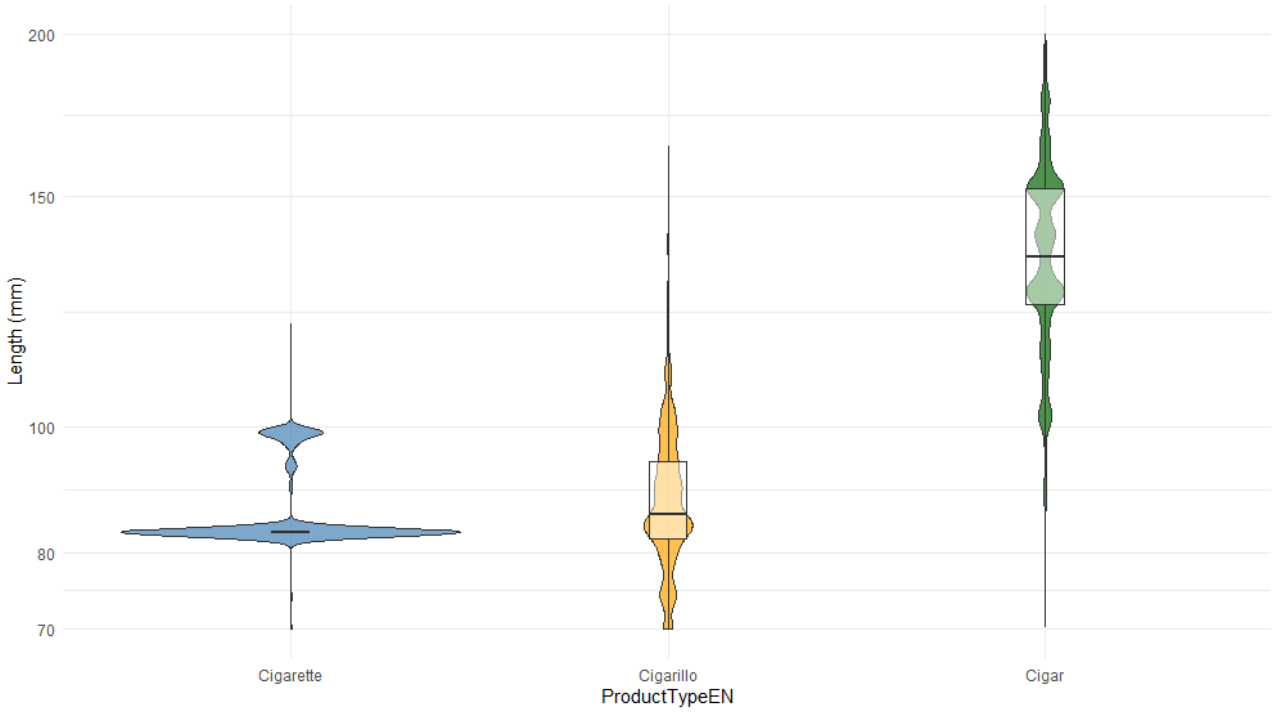
The dynamics of product launches show distinct peaks and declines across different periods, likely influenced by regulatory, economic, and market conditions. The most active markets in terms of new product introductions are France, the Netherlands, and Italy, while smaller markets maintain a steady but limited number of new product entries. The overall trend points towards a slowdown in recent years, which may require further analysis to identify the underlying causes.

6 Miscellaneous product characteristics

The next figure displays violin plots and box plots representing the distribution of lengths for three types of products: cigarettes, cigarillos, and cigars. The length is measured in millimeters (mm) along the y-axis, while the product categories are shown on the x-axis.

The lengths of cigarettes are tightly clustered around a central value of 80–100 mm, with a distinct peak at around 85 mm. There is a minor spread observed above and below this range, but the distribution is relatively narrow, indicating that cigarette lengths are standardized.

Figure. Distribution of sizes for cigarettes, cigars, and cigarillos.



Cigarillos exhibit a broader range of lengths compared to cigarettes, with a median around 90–100 mm. The distribution is more symmetric, with a greater variation in cigarillo sizes. This may be due to the diversity of cigarillo products, which can vary more in size depending on brand and style. The distribution suggests that while some cigarillos are of similar length to cigarettes, others are distinctly longer, reaching lengths close to those of smaller cigars.

Cigars have the greatest variation in length, ranging from 70 mm to over 180 mm. The distribution is bimodal, with peaks around 110 mm and 150 mm, indicating two main size categories within the

cigar group. The large spread and multiple peaks highlight the significant heterogeneity in cigar sizes, reflecting the wide variety of cigar types available on the market (e.g., small cigars, medium-sized, and large premium cigars).

The distribution of product lengths varies significantly across the three product categories, with cigarettes showing the most standardized lengths, cigarillos demonstrating moderate variation, and cigars exhibiting the greatest diversity in size. This likely reflects both regulatory standards for cigarettes and greater flexibility in the manufacturing and marketing of cigars and cigarillos.

The next table shows the distribution of different types of product packaging for various tobacco products. Each row represents a specific packaging format (e.g., box, tin, pouch), and each column corresponds to a product type or a group of product types. The values within the cells indicate the proportion of each packaging format used for the associated product type.

Table. Main product packaging by type.

ProductPackage	Cigarette	Cigarillo	Cigar	Roll your own tobacco	Pipe tobacco	Waterpipe tobacco	Chewing tobacco	Nasal tobacco
Block/Foil pack		0.1	0.2	1.0	8.8		1.6	
Carton box	0.1	8.7	5.4	0.3	0.1	32.6	4.2	
Cuboid can			0.3	18.8	9.6	1.5	8.3	
Cylinder card/can			0.1	8.1	2.3	6.4	18.2	
Flow wrap		0.2	0.7	0.3	0.2		1.0	
Hinged box	2.2	25.9	52.8	0.1	0.1		5.2	
Multi-pack display	0.2	0.6	0.3	0.1			9.9	
Pouch with flap	0.0		0.1	36.3	30.8		1.0	
Round tin			0.0	0.8	26.9	21.3	50.5	58.7
Bucket (Cylindrical or cuboid)		0.2	0.1	12.1	0.7	2.9		
Bundle		0.0	7.2	0.4		0.0		
Cylinder tin			0.2	8.5	8.1	9.4		16.4
Flip top box, bevel corner/octagonal	5.7		0.1	1.1	0.2			
Flip top box, rounded corner	8.1	0.1	0.6			0.0		
Flip top box, square corner	80.0	5.1	4.8	1.2	0.3	10.7		
Flip top pack		0.8	0.1			4.0		3.2
Folding box		3.1	1.4	0.0	2.3	1.7		0.5
Folding pouch			0.1	2.8	2.1	2.1		
Hinged tin		16.6	1.6	1.0	1.4			
Multi cigar tube			0.1					
Shell/Hull and Slide box	0.1	21.7	8.0			0.3		
Shoulder hinged box	0.4	15.7	4.9					
Single tube tin			0.6					
Slide lid box		0.3	10.1					10.1
Soft pack	3.2	1.0	0.3	0.1	0.4	5.0		
Standing pouch			0.1	6.9	5.7	1.5		10.6
Plastic container						0.5		0.5
Standing pouch roll-fold				0.1	0.1			

Cigarettes seem to have a few dominant packaging types, such as hard packs and soft packs, with hard packs making up a significant proportion (e.g., 80%). This reflects the standardized packaging commonly used in the cigarette industry.

Roll-your-own tobacco and waterpipe tobacco show a preference for pouches and plastic containers, which are typically used for bulk or loose products.

Some product types, like chewing tobacco and pipe tobacco, exhibit a broader range of packaging options, including tins, pouches, and plastic containers, indicating a more diverse packaging strategy to cater to different consumer preferences.

Cigars show a variety of packaging formats, including tubes, tins, and individual wraps, reflecting the premium nature of many cigar products and their need for specialized packaging to maintain quality.

A few specific formats, such as glass jars or aluminum tins, appear less frequently and only for certain products. For example, glass jars are present in a limited capacity for chewing tobacco and

pipe tobacco. Some categories have a unique preference, such as aluminum tubes for certain cigar products, which may be used for higher-end or niche market segments.

Standardized packaging, such as hard packs for cigarettes or pouches for loose tobacco, is predominant for mass-market products, suggesting economies of scale and regulatory influence. Conversely, niche products like cigars show more fragmented packaging strategies, reflecting a greater emphasis on product differentiation and preservation.

The distribution of packaging formats varies widely depending on the product type, with standardized formats dominating for high-volume products (e.g., cigarettes) and more diverse options for niche or premium products (e.g., cigars and chewing tobacco). This diversity in packaging likely reflects differences in consumer preferences, regulatory requirements, and market positioning strategies across the tobacco industry.

7 Ingredients

The following tables represent the 30 most common ingredients in each product type. For cigarettes and cigarillos, which may have filters, we used the ingredient categorization (burned or unburned) to determine whether it was a tobacco additive or a substance or component of the filter. It is important to note that this data is entered by the declarants, and errors are possible.

7.1 Top most frequent ingredients by product type

Table. Top 30 ingredients (cigars).

Product Type	Generic Substance	Median Conc (ppm)	P05 (ppm)	P95 (ppm)
Cigar	NICOTIANA TABACUM	999 103	70 000	1 000 000
Cigar	CELLULOSE, MODIFIED	15 000	345	45 455
Cigar	WATER	0	0	150 000
Cigar	CITRIC ACID	0	0	13
Cigar	PROPYLENE GLYCOL	7 256	767	199 775
Cigar	GUM TRAGACANTH	14 994	100	426 227
Cigar	CELLULOSE	9 291	5 508	282 053
Cigar	MINERAL OILS	7 117	4 968	60 466
Cigar	CARAMEL	145	7	425
Cigar	GLYCERIN	1 298	87	49 940
Cigar	GUAR GUM	7 092	89	7 094
Cigar	HYMETELLOSE	4 758	4 757	21 219
Cigar	VANILLIN	23 803	6 163	28 750
Cigar	SILICON DIOXIDE	115	34	117
Cigar	SORBIC ACID	571	39	667
Cigar	POTASSIUM ACETATE	2 205	20	8 715
Cigar	GLYCYRRHIZA GLABRA, EXT.	22 450	13 625	24 985
Cigar	POTASSIUM CITRATE MONOHYDRATE	2 450	2 400	8 715
Cigar	METHYLPARABEN SODIUM	1 250	923	2 058
Cigar	ETHYL VANILLIN	11 902	6 230	15 895
Cigar	ETHANOL	46 875	6 140	137 760
Cigar	SODIUM BENZOATE	718	2	973
Cigar	CORN SYRUP	17 156	1 650	18 893
Cigar	ACETIC ACID	16 109	11	-
Cigar	THEOBROMA CACAO, EXT.	225	225	15 351
Cigar	POTASSIUM TARTRATE HEMIHYDRATE	250	222	250
Cigar	POTASSIUM SORBATE	139	14	677
Cigar	1,3-BUTANEDIOL	3 188	2 406	3 890
Cigar	TRIACETIN	7 678	767	18 627
Cigar	LACTIC ACID	26 340	22 833	27 778

Table. Top 30 ingredients (cigarillos).

Product Type	Generic Substance	Median Conc (ppm)	P05 (ppm)	P95 (ppm)
Cigarillo	NICOTIANA TABACUM	137 051	30 108	999 100
Cigarillo	CELLULOSE, MODIFIED	3 465	55	8 525
Cigarillo	CELLULOSE	12 609	8 863	52 771
Cigarillo	PROPYLENE GLYCOL	18 491	2 164	33 903
Cigarillo	POTASSIUM SORBATE	146	29	235
Cigarillo	CARAMEL	421	16	1 068
Cigarillo	GLYCERIN	3 373	20	23 493
Cigarillo	POLYVINYL ACETATE	444	222	11 556
Cigarillo	GUAR GUM	78	49	2 797
Cigarillo	POTASSIUM CITRATE	1 473	580	1 761
Cigarillo	METHYLPARABEN SODIUM	47	30	60
Cigarillo	C.I. PIGMENT YELLOW 42	1 176	842	2 516
Cigarillo	POTASSIUM CITRATE MONOHYDRATE	1 028	729	1 087
Cigarillo	SORBITOL	1 028	729	1 087
Cigarillo	POTASSIUM ACETATE	82	38	169
Cigarillo	TARTARIC ACID	411	292	435
Cigarillo	KAOLIN	6 415	6 070	33 176
Cigarillo	ETHYLENEVINYLACETATE COPOLYMER	5 895	5 000	18 185
Cigarillo	ETHANOL	5 022	0	15 616
Cigarillo	BENZOIC ACID	157	73	3 178
Cigarillo	INVERT SUGAR	11 720	4 138	16 356
Cigarillo	C.I. DIRECT BLUE 71	1 028	729	1 079
Cigarillo	C.I. DIRECT ORANGE 102	1 028	729	1 079
Cigarillo	C.I. FOOD YELLOW 3	1 028	729	1 079
Cigarillo	WATER	96 400	13 652	140 000
Cigarillo	SILICON DIOXIDE	87	85	93
Cigarillo	SODIUM BENZOATE	724	32	1 913
Cigarillo	CALCIUM CARBONATE	5 319	5 250	12 373
Cigarillo	VANILLIN	5 596	5 290	11 743
Cigarillo	CITRIC ACID	780	780	1 071

Table. Top 30 ingredients (cigarettes).

Product Type	Generic Substance	Median Conc (ppm)	P05 (ppm)	P95 (ppm)
Cigarette	NICOTIANA TABACUM	93 644	23 520	229 352
Cigarette	PROPYLENE GLYCOL	9 395	5 601	21 938
Cigarette	GLYCERIN	1 486	13	20 881
Cigarette	INVERT SUGAR	8 778	1 841	18 479
Cigarette	SUCROSE	9 316	5 091	13 352
Cigarette	WATER	9 616	0	80 830
Cigarette	TRIACETIN	12 747	35	17 059
Cigarette	THEOBROMA CACAO, EXT.	4 159	762	8 660
Cigarette	POTASSIUM SORBATE	4	3	4
Cigarette	C.I. FOOD RED 17:1	3	1	4
Cigarette	POLYTETRAFLUOROETHYLENE	7	6	9
Cigarette	CELLULOSE	5 635	5 219	7 617
Cigarette	FD&C BLUE NO. 1 ALUMINUM LAKE	3	1	4
Cigarette	GLYCYRRHIZA GLABRA, EXT.	1 072	529	4 935
Cigarette	FICUS CARICA, EXT.	1 224	1 188	1 399
Cigarette	CALCIUM CARBONATE	19 546	4	21 010
Cigarette	ETHYLENEVINYLACETATE COPOLYMER	5 136	770	6 263
Cigarette	BRILLIANT BLUE FCF	1	1	3
Cigarette	GLUCOSE	4	4	4
Cigarette	AMARANTH DYE	1	1	1
Cigarette	C.I. FOOD YELLOW 3	1	1	1
Cigarette	C.I. PIGMENT YELLOW 100	3	0	14
Cigarette	D & C RED NO. 7	1	0	2
Cigarette	LIMESTONE	8 653	6 062	11 006
Cigarette	SORBITOL	143	5	442
Cigarette	C.I. ACID BLUE 9, ALUMINUM SALT (3:2)	1	1	11
Cigarette	C.I. FOOD YELLOW 3 ALUMINUM LAKE	5	1	13
Cigarette	LACTIC ACID	2 079	1 036	2 251
Cigarette	PENTAERYTHRITOL	22	1	30
Cigarette	GUAR GUM	2 669	2 007	4 119

Table. Top 30 ingredients (filters).

Product Type	Generic Substance	Median Conc (ppm)	P05 (ppm)	P95 (ppm)
Filter	CELLULOSE	30 828	15 001	75 036
Filter	CELLULOSE, MODIFIED	450	29	155 383
Filter	CALCIUM CARBONATE	14 025	4 875	26 166
Filter	WATER	7 518	0	14 438
Filter	STARCH, MODIFIED	1 766	234	2 560
Filter	TRIACETIN	12 667	29	19 075
Filter	FERROSOFERRIC OXIDE	40	4	286
Filter	ACETYL TRIBUTYL CITRATE	178	90	421
Filter	FERRIC OXIDE	77	13	211
Filter	GUAR GUM	149	48	681
Filter	TITANIUM DIOXIDE	750	238	894
Filter	POTASSIUM CITRATE MONOHYDRATE	715	354	1 255
Filter	POLYVINYL ALCOHOL	609	227	839
Filter	HYDRATED FERRIC OXIDE	1 226	3	1 928
Filter	C.I. PIGMENT YELLOW 42	794	138	1 458
Filter	ETHYLENEVINYLACETATE COPOLYMER	7 402	4 521	17 374
Filter	ALUMINUM	59	7	142
Filter	POLYVINYL ACETATE	433	91	9 613
Filter	STARCH	1 050	667	1 752
Filter	GUM ARABIC	968	899	1 474
Filter	COPPER	95	44	121
Filter	D & C RED NO. 7	0	0	38
Filter	SILICON DIOXIDE	10	0	50
Filter	PARAFFINS	168	0	432
Filter	POTASSIUM CITRATE	1 405	572	1 615
Filter	FD&C BLUE NO. 1 ALUMINUM LAKE	0	0	128
Filter	C.I. PIGMENT YELLOW 100	1	1	56
Filter	CARBON	3	1	60 110
Filter	BRILLIANT BLUE FCF	0	0	128
Filter	ALUMINUM, 2-(2-QUINOLINYL)-1H-INDENE-1,3(2H)-DIONE SULFO DERIVS. COMPLEXES	1	1	54

Table. Top 30 ingredients (RYO tobacco).

Product Type	Generic Substance	Median Conc (ppm)	P05 (ppm)	P95 (ppm)
Roll your own tobacco	NICOTIANA TABACUM	178 819	19 885	717 000
Roll your own tobacco	PROPYLENE GLYCOL	21 260	10 400	39 887
Roll your own tobacco	SODIUM BENZOATE	904	280	3 697
Roll your own tobacco	WATER	43 815	0	153 000
Roll your own tobacco	GLYCERIN	20 300	1 400	29 828
Roll your own tobacco	POTASSIUM SORBATE	720	600	1 549
Roll your own tobacco	INVERT SUGAR	22 134	4 452	52 314
Roll your own tobacco	CITRIC ACID MONOHYDRATE	1 186	3	1 778
Roll your own tobacco	CELLULOSE	9 600	5 092	-
Roll your own tobacco	CITRIC ACID	1 096	50	900 000
Roll your own tobacco	ACETIC ACID	6 759	1 500	9 970
Roll your own tobacco	SUCROSE	29 245	3 113	44 500
Roll your own tobacco	SORBITOL	167	167	15 000
Roll your own tobacco	THEOBROMA CACAO, EXT.	3 023	644	-
Roll your own tobacco	STARCH, MODIFIED	22 650	7 170	31 980
Roll your own tobacco	BENZOIC ACID	2 250	25	-
Roll your own tobacco	CORN SYRUP	60 952	1 530	67 696
Roll your own tobacco	CALCIUM CARBONATE	8 213	6 570	-
Roll your own tobacco	GLYCYRRHIZA GLABRA, EXT.	5 420	1 586	85 800
Roll your own tobacco	ETHANOL	3 820	1 090	33 384
Roll your own tobacco	GUAR GUM	3 367	1 963	3 367
Roll your own tobacco	LIMESTONE	13 162	8 175	17 666
Roll your own tobacco	MAGNESIUM OXIDE	612	209	612
Roll your own tobacco	MALT EXTRACT	2 250	2 250	2 250
Roll your own tobacco	CARAMEL	1 340	1 340	1 340
Roll your own tobacco	MAPLE SYRUP	5 050	5 050	5 050
Roll your own tobacco	FRUCTOSE	3 000	2 384	3 006
Roll your own tobacco	VANILLIN	9 135	1 317	22 500
Roll your own tobacco	ETHYL VANILLIN	1 317	1 317	22 500
Roll your own tobacco	ACETOIN	1 000	1 000	1 352

Table. Top 30 ingredients (pipe tobacco).

Product Type	Generic Substance	Median Conc (ppm)	P05 (ppm)	P95 (ppm)
Pipe tobacco	NICOTIANA TABACUM	75 142	7 809	665 800
Pipe tobacco	PROPYLENE GLYCOL	26 329	8 069	50 990
Pipe tobacco	SODIUM BENZOATE	1 513	200	12 610
Pipe tobacco	INVERT SUGAR	66 029	15 000	174 600
Pipe tobacco	GLYCYRRHIZA GLABRA, EXT.	12 433	3	24 490
Pipe tobacco	POTASSIUM SORBATE	303	0	4 000
Pipe tobacco	GLYCERIN	10 609	800	30 230
Pipe tobacco	BENZOIC ACID	119	75	2 250
Pipe tobacco	ETHANOL	5 539	9	20 309
Pipe tobacco	THEOBROMA CACAO, EXT.	1 997	103	17 973
Pipe tobacco	WATER	114 603	1 095	162 777
Pipe tobacco	VANILLIN	6 910	5 010	19 340
Pipe tobacco	GLYCYRRHIZIN	1 020	234	1 390
Pipe tobacco	SUCROSE	7 554	5 566	18 714
Pipe tobacco	METHYL ETHYL KETONE	19	0	61
Pipe tobacco	GLUCOSE	1 756	13	75 430
Pipe tobacco	CORN SYRUP	5	0	129
Pipe tobacco	SORBITOL	14 073	5 009	20 579
Pipe tobacco	DEXTROSE	13 680	6 140	48 184
Pipe tobacco	MOLASSES	162	1	10 672
Pipe tobacco	GUM ARABIC	2 244	576	10 940
Pipe tobacco	BENZYL ALCOHOL	8 909	0	11 460
Pipe tobacco	TRIACETIN	204	18	11 240
Pipe tobacco	ALCOHOL	5 265	5 265	12 021
Pipe tobacco	POTASSIUM ACETATE	4	4	5
Pipe tobacco	CITRIC ACID	18	15	1 100
Pipe tobacco	ETHYL VANILLIN	5 208	5 208	5 654
Pipe tobacco	HONEY	22 540	22 540	22 540
Pipe tobacco	CITRIC ACID MONOHYDRATE	10	10	440
Pipe tobacco	STARCH, MODIFIED	4 120	4 120	4 120

Table. Top 30 ingredients (waterpipe tobacco).

Product Type	Generic Substance	Median Conc (ppm)	P05 (ppm)	P95 (ppm)
Waterpipe tobacco	NICOTIANA TABACUM	140 000	42 029	1 000 000
Waterpipe tobacco	GLYCERIN	400 000	5 000	662 660
Waterpipe tobacco	PROPYLENE GLYCOL	45 360	5 000	235 789
Waterpipe tobacco	SUCROSE	280 000	166 000	294 000
Waterpipe tobacco	CITRIC ACID	720	92	1 789
Waterpipe tobacco	WATER	141 000	41 880	164 000
Waterpipe tobacco	SODIUM BENZOATE	720	400	9 350
Waterpipe tobacco	ALUMINUM SULFATE	720	400	720
Waterpipe tobacco	FLAVOR	50 000	13 660	85 000
Waterpipe tobacco	MOLASSES	205 229	157 927	300 000
Waterpipe tobacco	CORN SYRUP	357 143	50 600	357 200
Waterpipe tobacco	INVERT SUGAR	216 940	140 000	-
Waterpipe tobacco	FRUCTOSE	200 000	1 191	450 000
Waterpipe tobacco	CITRAL	13 793	5 000	68 966
Waterpipe tobacco	CITRUS, EXT.	27 720	6 000	60 000
Waterpipe tobacco	VANILLIN	28 035	5 000	70 000
Waterpipe tobacco	ALLURA RED AC	250	200	4 000
Waterpipe tobacco	SILICON DIOXIDE	4 000	250	4 000
Waterpipe tobacco	CELLULOSE	1 101	1	1 312
Waterpipe tobacco	PECTIN	383	0	550
Waterpipe tobacco	ISOAMYL ACETATE	20 000	5 000	47 170
Waterpipe tobacco	BETA-FRUCTOFURANOSIDASE	242 136	197 034	285 000
Waterpipe tobacco	POTASSIUM SORBATE	3	0	4 715
Waterpipe tobacco	ETHYL ACETATE	9 000	5 000	110 000
Waterpipe tobacco	TROPICAL FLAVOR	28 000	8 403	81 633
Waterpipe tobacco	LIMONENE	17 000	5 000	70 000
Waterpipe tobacco	ETHYL BUTYRATE	19 470	6 000	110 000
Waterpipe tobacco	TRIACETIN	22 500	8 634	60 000
Waterpipe tobacco	ETHANOL	29 257	5 698	39 000
Waterpipe tobacco	BERRIES FLAVOR	45 872	6 897	77 444

Table. Top 30 ingredients (nasal tobacco).

Product Type	Generic Substance	Median Conc (ppm)	P05 (ppm)	P95 (ppm)
Nasal tobacco	NICOTIANA TABACUM	150 000	36 000	607 350
Nasal tobacco	MENTHOL	18 833	6 750	43 000
Nasal tobacco	WATER	91 738	68 347	167 500
Nasal tobacco	MINERAL OILS	93 067	14 583	143 200
Nasal tobacco	SODIUM CHLORIDE	7 678	6 000	33 333
Nasal tobacco	POTASSIUM CARBONATE	29 701	15 880	56 000
Nasal tobacco	CAMPHOR	10 667	7 603	17 100
Nasal tobacco	PROPYLENE GLYCOL	5 289	569	6 700
Nasal tobacco	CAFFEINE	250 000	250 000	250 000
Nasal tobacco	DEXTROSE MONOHYDRATE	249 500	249 500	249 500
Nasal tobacco	TAURINE	500 000	500 000	500 000
Nasal tobacco	SODIUM CARBONATE DECAHYDRATE	6 668	6 329	9 155
Nasal tobacco	EUCALYPTUS, EXT.	30 659	14 746	52 933
Nasal tobacco	CALCIUM HYDROXIDE	10 000	5 000	40 200
Nasal tobacco	SODIUM CARBONATE	51 250	5 200	118 000
Nasal tobacco	SODIUM BICARBONATE	25 310	25 310	82 000
Nasal tobacco	CALCIUM CARBONATE	8 750	8 750	8 750
Nasal tobacco	CARBON	1 250	1 250	1 250
Nasal tobacco	DISODIUM HYDROGEN PHOSPHATE	625	625	625
Nasal tobacco	MAGNESIUM CARBONATE BASIC	1 250	1 250	1 250
Nasal tobacco	MOLASSES	125 000	41 667	212 500
Nasal tobacco	AMMONIUM CHLORIDE	7 431	7 431	9 000
Nasal tobacco	ANETHOLE	6 006	6 006	6 006
Nasal tobacco	CITRUS, EXT.	8 333	8 333	26 167
Nasal tobacco	ETHANOL	21 400	9 500	270 200
Nasal tobacco	ALCOHOL	0	0	0
Nasal tobacco	CINNAMOMUM, EXT.	19 000	8 333	32 000
Nasal tobacco	ETHYLPARABEN	300	300	400
Nasal tobacco	MENTHOL / MINT FLAVOR	24 000	300	40 000
Nasal tobacco	TAMARINDUS INDICA, EXT.	8 900	5 900	9 300

Table. Top 30 ingredients (chewing tobacco).

Product Type	Generic Substance	Median Conc (ppm)	P05 (ppm)	P95 (ppm)
Chewing tobacco	NICOTIANA TABACUM	376 800	102 310	600 000
Chewing tobacco	WATER	482 400	169 291	490 500
Chewing tobacco	MINERAL OILS	19 200	16 667	19 200
Chewing tobacco	CALCIUM HYDROXIDE	45 600	45 500	47 000
Chewing tobacco	CARBON	6 000	6 000	6 000
Chewing tobacco	CALCIUM CARBONATE	52 400	52 400	53 000
Chewing tobacco	DISODIUM HYDROGEN PHOSPHATE	4 000	4 000	4 000
Chewing tobacco	MAGNESIUM CARBONATE BASIC	5 600	5 500	5 600
Chewing tobacco	SODIUM CHLORIDE	31 091	13 996	84 000
Chewing tobacco	SODIUM CARBONATE	31 818	12 000	50 706
Chewing tobacco	PROPYLENE GLYCOL	31 667	5 273	79 000
Chewing tobacco	GLYCERIN	19 455	4 709	64 000
Chewing tobacco	SALVIA, EXT.	8 000	8 000	8 000
Chewing tobacco	MENTHOL	9 873	6 644	77 600
Chewing tobacco	MENTHA, EXT.	7 782	5 027	35 385
Chewing tobacco	POTASSIUM SORBATE	1 429	769	10 380
Chewing tobacco	FLAVOR	40 000	40 000	40 000
Chewing tobacco	GLYCYRRHIZA GLABRA, EXT.	8 709	5 000	141 667
Chewing tobacco	AMMONIUM GLYCYRRHIZATE	9 000	7 692	16 000
Chewing tobacco	SUCROSE	184 000	31 579	232 283
Chewing tobacco	SORBITOL	17 000	15 000	84 615
Chewing tobacco	POTASSIUM CARBONATE	5 000	5 000	47 091
Chewing tobacco	ETHANOL	9 231	22	17 458
Chewing tobacco	GUM ARABIC	56 000	968	73 077
Chewing tobacco	CELLULOSE, MODIFIED	13 600	13 600	25 867
Chewing tobacco	GUM BASE	517 867	517 867	624 000
Chewing tobacco	SODIUM BICARBONATE	32 000	6 667	52 000
Chewing tobacco	INVERT SUGAR	18 000	17 000	18 000
Chewing tobacco	ANETHOLE	8 000	6 417	11 811
Chewing tobacco	BENTONITE	111 376	111 376	116 793

7.2 Discussion on main ingredients

Unsurprisingly, tobacco (Nicotiana tabacum) is the main ingredient in all products. Water is frequently listed, likely as a processing aid but also as a humectant. Propylene glycol, glycerin and ethanol also show up frequently, indicating their widespread use across multiple tobacco product categories.

Some ingredients are specific to certain product types.

Cigars: ingredients like gum tragacanth, potassium tartrate hemihydrate, and 1,3-butanediol are specific to cigars, reflecting the different binder and humectant requirements for cigar manufacturing.

Cigarettes: unique dyes and additives are present, likely used in specialty products or for specific functional properties of the paper.

Cigarillos: contains unique colorants and chemicals like C.I. Direct Blue 71 and C.I. Direct Orange 102, which are likely used for product differentiation and appearance.

Filters: specific chemicals like ferrosoferric oxide and acetyl tributyl citrate are used exclusively in filters, reflecting their role in modifying the filtering properties and structural integrity.

Roll-Your-Own Tobacco: unique components include magnesium oxide, maple syrup, and acetoin, reflecting additives aimed at altering taste and smoking experience.

Pipe Tobacco: ingredients like glycyrrhizin and methyl ethyl ketone are unique, suggesting a focus on enhancing flavor or burning properties.

Waterpipe Tobacco: specific ingredients such as aluminum sulfate, citral, and isoamyl acetate are unique to this category, highlighting additives used for moisture, flavor, and stability.

Nasal Tobacco: unique ingredients include camphor, caffeine, and taurine, indicating specific functional additives for nasal tobacco products. Their presence is questionable regarding regulatory compliance.

Chewing Tobacco: contains unique ingredients such as Salvia extract, Mentha extract, and Ammonium glycyrrhizate, which are used for specific flavoring and texture modification.

Each product type has a distinct set of unique ingredients that cater to the specific properties, flavor, and consumer experience desired for that category.

8 Conclusion

This analysis of a declarative dataset covering tobacco products across 12 national markets has provided valuable insights into ingredient composition, packaging trends, and product distribution.

Regarding ingredients, there is an uniformity in core components, while other ingredients show more variability depending on product type and specific function (e.g., flavorings, combustion modifiers, or structural agents). Each product type, such as cigarettes, cigars, and waterpipe tobacco, has a distinct ingredient profile, with some unique substances catering to the specific needs and regulations of that product category. This differentiation emphasizes the complexity and tailored nature of tobacco product formulations.

The number and type of products available vary significantly between national markets, reflecting diverse consumer preferences and regulatory landscapes. Larger markets like France, Italy, and the Netherlands exhibit more product variety, while smaller markets show a more limited selection.

Analysis of packaging data shows that standard formats like hard packs dominate for mass-market products (e.g., cigarettes), while niche categories (e.g., cigars and waterpipe tobacco) utilize a broader

range of packaging options, reflecting market positioning strategies and product differentiation.

The presence of certain chemicals (e.g., colorants, humectants, and flavor additives) varies widely across product types, which may have implications for both health impacts and regulatory scrutiny. Understanding these variations is critical for developing targeted regulatory measures.

Overall, this exercise underscores the importance of standardized and accurate ingredient reporting for effective regulatory oversight and market analysis. The ability to systematically compare product formulations across multiple markets provides insights into industry practices, consumer trends, and potential areas for regulatory intervention. Future efforts could focus on enhancing data quality and exploring cross-market trends over time to track the impact of evolving regulations and consumer preferences.