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FOOTPRINT

Functional Tools for Pesticide Risk Assessment and Management

Specific Targeted Research Project

Thematic Priority: Policy-orientated research

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Characteristics of European agronomic scenarios

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RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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Foreword

The present report was prepared within the context of the work package WP2 ('High resolution scenario-based spatial zonation') of the FOOTPRINT project (<http://www.eu-footprint.org>).

The preferred reference to the present document is as follows:

Centofanti T. & Hollis J. (2006). Characteristics of European agronomic scenarios. Report DL11 of the FP6 EU-funded FOOTPRINT project [www.eu-footprint.org], 36p.

Thanks are due to Patricia Bellamy, Ian Truckell, and Andrew Rayner (Natural Resources Department, School of Applied Sciences, Cranfield University, United Kingdom).

Executive summary

The definition of agronomic scenarios for the EU is part of work package 2: high resolution scenario-based spatial zonation. The aim of this activity is to provide a set of generic scenarios that characterize the complete spectrum of European agricultural environments with respect of pesticides usage.

A list of FOOTPRINT crops of interest has been defined and templates for the critical crop growth stages required by the models to be used have been derived. When possible, application dates of pesticides have been included in the template. In order to identify areas homogeneous for selected agricultural practices, EU administrative areas at NUTS (Nomenclature of Territorial Units for Statistics) level 2 have been grouped together according to the similar crop growth stages.

Broad types of agriculture at a very fine spatial resolution (250 m x 250 m grid) have been identified using CORINE 2000. The CORINE-based land classes are currently being intersected with the NUTS level 2 maps and to each CORINE land cover-NUTS-2 combination attributes defining the crops present and their cover expressed as a percentage of the total agricultural area are being derived.

In addition a Principal Component Analysis has been carried out to define a set of socio-agronomic zones within Europe that group together NUTS level 2 areas according to their similarity with respect to: i) different crops, ii) the size range of farm holdings, iii) economic size of farm holdings, iv) age of the holders, and v) type of labour force fully employed in the farm. At this stage it is envisaged that the information will most likely be used to inform the piloting and evaluation of the FOOTPRINT tools (work package 6) and to improve their communication and dissemination (work package 7).

1 INTRODUCTION

FOOTPRINT aims at developing a suite of three pesticides risk prediction and management tools, for use by farmers and extension adviser at the farm scale, water managers at the catchment scale, and policy makers at the national scale. The tools are based on knowledge of processes, factors, and agricultural/landscape characteristics influencing pesticides fate and behaviour in the environment across Europe.

To provide estimates of pesticides concentrations in surface and groundwater FOOTPRINT will use refined pesticides fate models (MACRO and PRZM). The approach proposed in FOOTPRINT to characterize the spatial variation in model inputs is based on the identification of agro-environmental scenarios representing land areas that are homogeneous with respect to the critical factors that control pesticides fate. Within this context, the overall objective of work package 2 is to develop and apply a methodology for defining generic scenarios that characterize European agricultural environment that determine the fate of agriculturally applied pesticides within Europe. The agro-environmental scenarios are composed of a combination of four scenarios: soils scenarios, climatic scenarios, subsoil scenarios, and agronomic scenarios.

Agronomic scenarios are defined as areas in Europe where the dates of specific crop growth stages, and therefore the pesticide usage practices associated with them, are similar. The identification of such areas is based on EU administrative areas at NUTS level 2 because statistical data on specific crop coverage across Europe is available at this level of detail. Within these areas, the precise location of individual crops is identified using the CORINE 2000 land cover dataset. Although specific crops are not categorised in this dataset, it does identify classes of broad types of agricultural land at a very fine spatial resolution (250 m x 250 m grid cells). Integration of the CORINE 2000 land categories with the NUTS-2 crop statistics thus enables the identification of parcels of land on which a range of specific crops are likely to be grown.

A range of other agricultural statistics are available at NUTS level 2 resolution and these are currently being analysed to investigate whether they can provide useful information on factors other than cropping that may affect the usage of pesticides in different parts of Europe.

In addition we have produced a set of socio-agronomic zones within Europe that group together NUTS level 2 areas according to their similarity with respect to: i) different crops, ii)

the size range of farm holdings, iii) economic size of farm holdings, iv) age of the holders, and v) type of labour force fully employed in the farm.

Methods and results are presented in the following sections.

2 METHODOLOGY AND RESULTS

2.1 Template of crop growth stages

2.1.1 Sources of data

Data for France, Sweden and Greece have been provided by Benoit Real (ARVALIS, France), Nick Jarvis (SLU, Sweden), and Evangelia Evavoulidou (NAGREF, Greece), respectively. Data for UK have been provided by Ian Holman (Cranfield University). Data for Czech Republic, Hungary, Estonia, Latvia, Lithuania, Slovenia, Poland, and Slovakia have been obtained from the studies in support to the Monitoring of Agriculture with Remote Sensing, MARS project (MOCA, 2003). Data for Portugal, Austria, Finland, and some regions in South-West England are based on Saur et al. (2001). Data for Denmark will be provided by Jeanne Kjaer (GEUS, Denmark). For Italy and Spain data are based on Narciso *et al.* (1992). Data for Germany have been obtained from the National Weather Information Office. The complete version of the template has been circulated both among FOOTPRINT project's partners and among some members of the Advisory Committee for a final cross-check and completion of the template.

2.1.2 Description of the template

Templates of the growth stages for FOOTPRINT crops of interest (listed in Table 1) for the NUTS level 2 of the 23 European countries have been created as Excel files. Examples of the template for soft wheat are given in Appendix 2.

In the template all the 252 NUTS level 2 of the 23 EU countries are indicated although only the ones that have been highlighted (in bold and italic) produce the crop, i.e. have a crop cover area >0 according to the NUTS level 2 statistics. This information is provided in order to roughly estimate how relevant the crop production is in the country analysed. The following growth stages have been considered: sowing, germination, shooting or stem elongation, flowering, maturity, and harvest. These stages were selected because they relate

both to data required by the FOOTPRINT models and because of their relevance for pesticide usage. When the information was available, pre-emergence and the post-emergence application of pesticides have been indicated in the template. Early sowing and late sowing varieties have been taken into account.

The dates shown in the template indicate an average ± 2 weeks of the whole crop growth time range. In some cases, there can be important differences in time between areas within one region (NUTS) and this results in an extended set of dates for a specific crop growth stage.

All unique combinations of crop growth stages and NUTS level 2 have been identified and reported in a separate template and an example for the soya crop shown in Figure 1. Finally, a summary list of NUTS level 2 units with similar crop growth stages for each crop has been compiled to assist in the development of the FOOT tools during work package 5 (data not shown in the report).

The results show that the growth stages of the different crops vary considerably between regions within a country and between countries. Thus, combinations of unique NUTS level 2 and crop growth stages are possible only between some NUTS level 2 within a country.

List of crops used to define crop growth stages
Barley winter
Barley spring
Cotton
Durum wheat winter
Durum wheat spring
Flax
Tomatoes
Maize fodder
Maize grain spring
Maize grain summer
Rape
Sunflower
Olive plantation
Orchard
Potato winter
Potato main crop
Potato early
Field peas
Beans
Lentils
Soya late sowing

List of crops used to define crop growth stages
Soya early sowing
Rye
Soft wheat winter
Soft wheat spring
Sugar beet winter
Sugar beet spring
Tobacco
Vineyards

Table 1. List of crops used for the definition of crop growth stages
Early sowing and late sowing varieties have been taken into account.

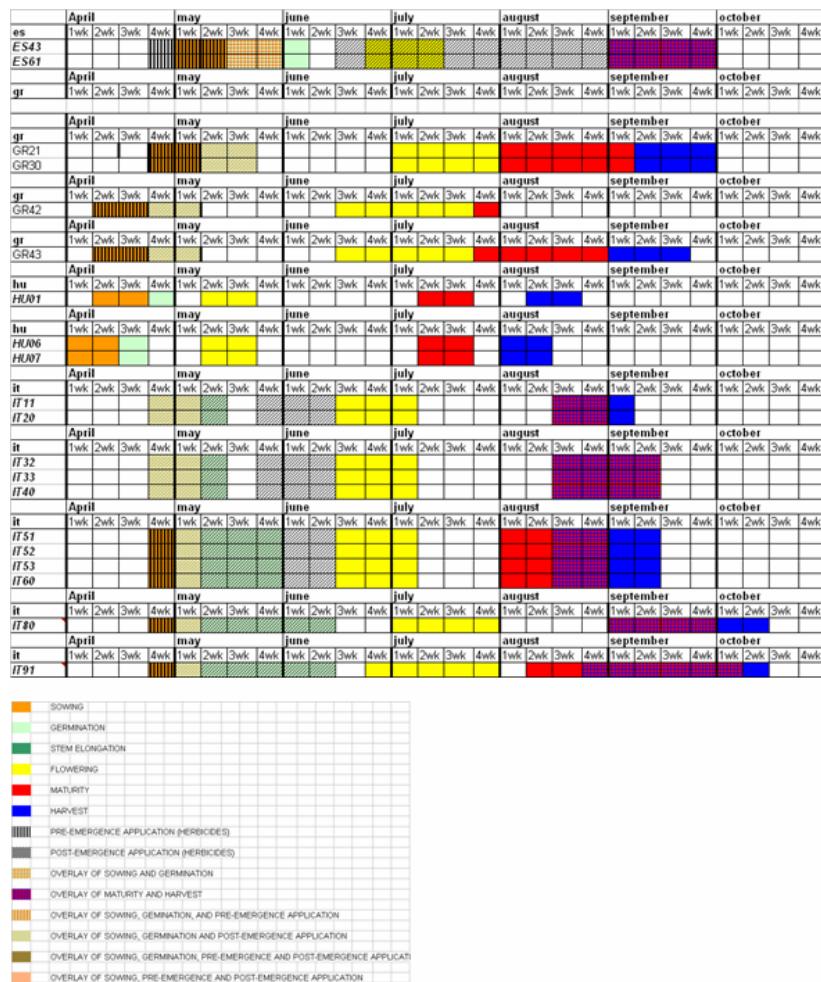


Figure 1. Example of unique combination of NUTS level 2 and crop (Soya) growth stages

2.2 Identification of land use patterns in Europe using CORINE 2000

Data on crop cover area and agricultural area at the NUTS level 2 have been obtained from the EUROSTAT dataset (EUROSTAT, 2006). The relative crop cover area expressed as a percentage of the agricultural area for each NUTS2 has been calculated and an example is shown in Figure 2. For some NUTS2 regions the data from Eurostat are not consistent because the crop cover area is higher than the agricultural area. Thus, these data are currently being cross-checked by the project partners.

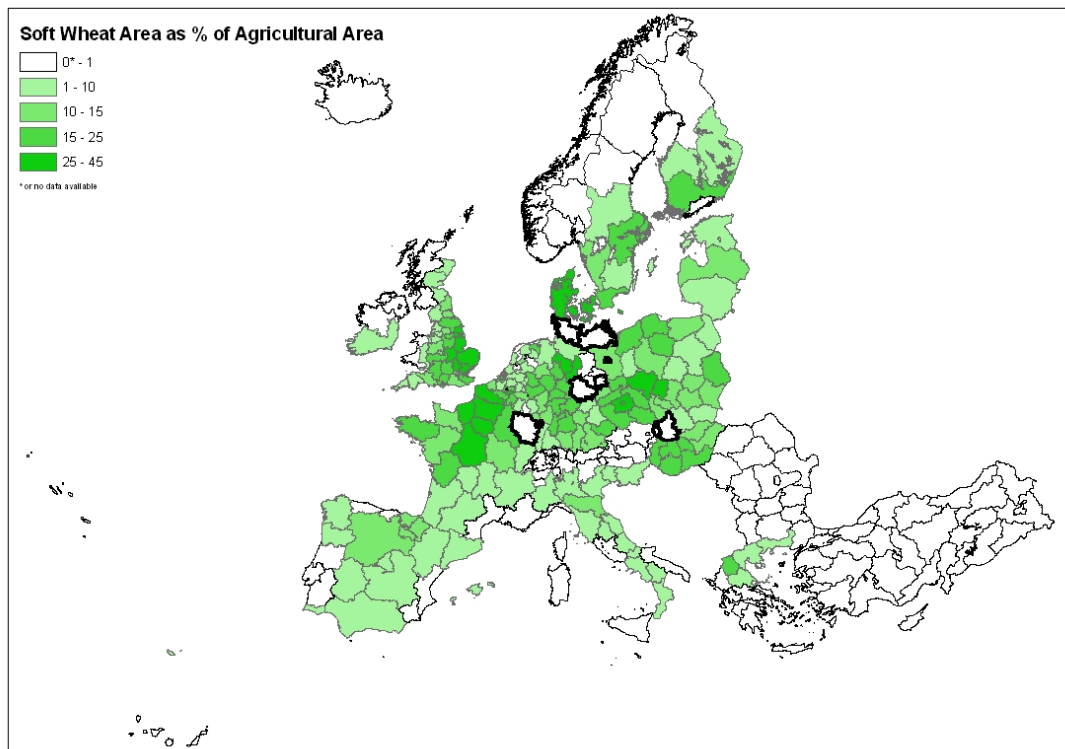


Figure 2. Example of soft wheat cover area expressed as percentage of agricultural area of NUTS level 2
Bold black lines indicate NUTS level 2 where the crop cover area is higher than the agricultural area

The CORINE 2000 land cover dataset has been used to define a precise spatial location of cropped areas within each NUTS level 2. CORINE 2000 identifies land cover at three levels of detail. Agricultural areas are differentiated at level 1 and are separated into Arable land, Permanent crops, Pastures and Heterogeneous Areas at level 2. At the third and most detailed level, Arable land is divided into:

Non (permanently) -irrigated arable land; permanently irrigated land; rice fields; vineyards; fruit trees & berry plantations; olive groves; pastures; annual crops associated with permanent crops; complex cultivation patterns; land principally occupied by agriculture with significant areas of natural vegetation; Agro-forestry areas.

The CORINE data allow the identification of broad types of agriculture at a very fine spatial resolution (250 m x 250 m) and the detection of land use patterns (i.e. extensive areas used for arable crops with adjacent areas of permanent crops) across Europe.

Using GIS, the CORINE-based land classes are currently being intersected with the NUTS level 2 maps and, to each CORINE land cover-NUTS-2 combination, attributes defining the crops present and their cover expressed as a percentage of the CORINE land category are being derived. An example of this derivation is shown in Table 2.

Crop type	Crop cover area as % of agricultural area (EUROSTAT)	CORINE 2000 land classes (level 3)	% cover in CORINE class
Barley	8.81	Non-irrigated arable land	17.5
Durum wheat	2.01		4.8
Fresh vegetables	0.62		1.6
Maize fodder	1.44		3.1
Maize grain	11.13		24.2
Oilseed	9.64		27.7
Potato	0.21		0.6
Pulse	3.3		8.9
Rape seed	3.92		11.6
Rye	1.91		6.4
Soya	2.94		10.5
Sugar beet	2.42		2.5
Sunflower	1.91		2.0
			Permanently irrigated land
		Rice fields	0
Vineyards	7.94	Vineyards	100
Fruit trees and berry plantations	0.67	Fruit trees and berry plantations	100
		Olive groves	0
Pastures	12.01	Pastures	100
		Annual crops associated with permanent crops	0
		Complex cultivation patterns	0
		Land principally occupied by agriculture, with significant areas of natural vegetation	0
		Agro-forestry areas	0

Table 2. Example of derivation of the percentage crop cover per CORINE land cover category for NUTS2 unit AT 11 (Burgenland)

2.3 Analysis of cropping and other agricultural statistics at NUTS level 2 resolution

2.3.1 Methodology

The following variables have been used to define a set of socio-agronomic areas:

- Crop coverage (1000 ha)
- Size of holding (1000 ha) (Holding: technical-economic unit under single management engaged in agricultural production)
- Economic size of holding (ESU, European Size Unit, 1 ESU=1200 € of Standard Gross Margin)
- Type of Labour force (AWU, Annual Work Unit, equivalent to fulltime employment)
- Holder's age (years)
- Standard Gross Margin of the holding (Million €)

Data have been obtained from EUROSTAT (2006) but wherever possible have been cross-checked with regional agricultural statistics from national census data.

Principal Component Analysis and K-means cluster analysis were then carried out to define a set of socio-agronomic zones within Europe that group together NUTS level 2 areas according to their similarity with respect to the above mentioned variables.

2.3.2 Statistical analysis

All data expressed in ha (crops, AA of holdings, and economic size) were square root-transformed, while the rest of data were log-transformed.

Principal Component Analysis (PCA) was performed using STATISTICA (Release 7, Statsoft, Inc., 2006). NUTS were first divided into Northern and Southern regions by using Olive plantation as a discriminatory crop. PCA was performed twice in order to reduce the number of variables from 45 to 24: 16 variables for the Southern region and 18 variables for the Northern region. This obtained a clear distinction of the NUTS into homogeneous groups (4 groups for the Southern European countries and 6 groups for the Northern European countries), which need to be indicated in the k-means cluster analysis.

The k-means cluster analysis showed that 3 groups define the variability within Southern European countries and 6 groups define the variability between Northern European countries (Figure 3).

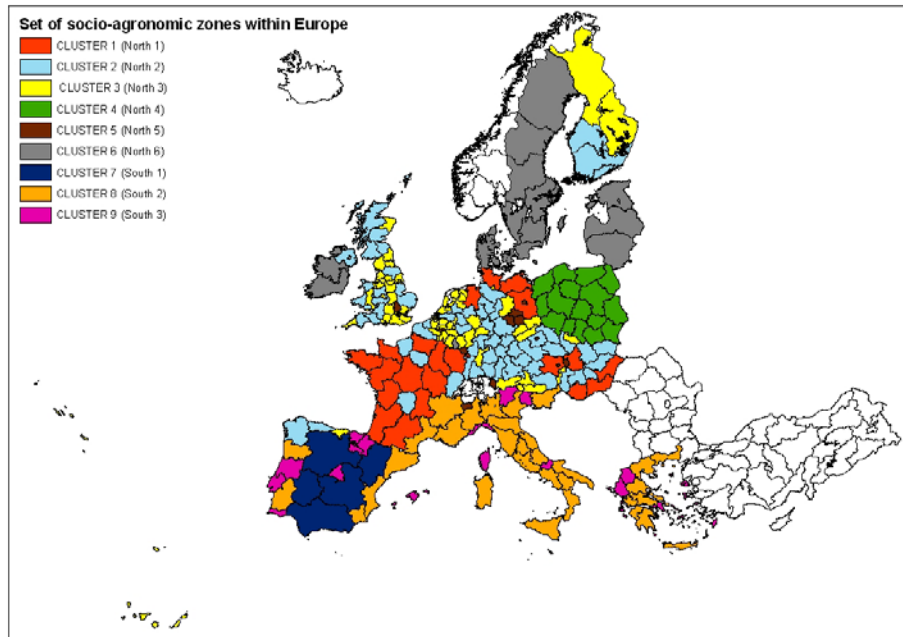


Figure 3. Initial set of 9 socio-agronomic zones across Europe resulting from the k-means cluster analysis of NUTS level 2 units

Following the initial k-means cluster analysis, NUTS level 2 units within each of the 9 clusters were further grouped using a tree-clustering technique: 70 homogeneous areas across Europe were identified. An example of the 4 homogeneous areas classified within cluster 1 is shown in Figure 4 and a description of their unique characteristics is shown in Table 3.

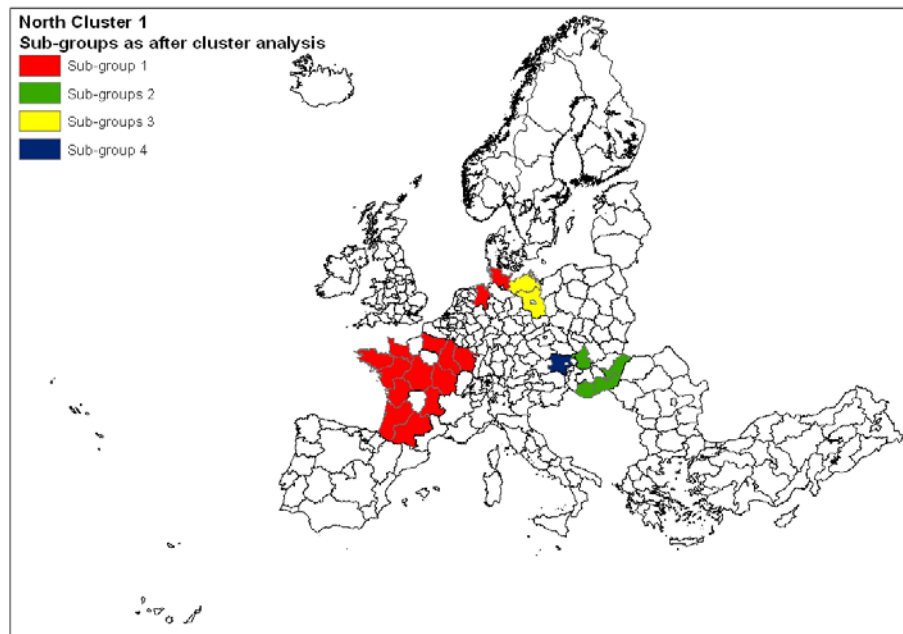


Figure 4. Subdivision of cluster 1 (Northern Europe) following tree cluster analysis.

Sub-group area	Crop cover area (ha)	Size of farm holding (ha)	Economic size of farm holding (ESU)	Type of labour Force (AWU)	Standard gross margin (Million €)
1	Soft wheat, maize fodder, maize grain, Oilseed, sugar beet, vineyards	Large (30 to > 50 ha)	Large areas with 40 to >100 ESU	Farms employing half external labour force (ELF), few holders working full-time (age 44-54 years)	Highest
2	Soft wheat, maize grain, Oilseed	>50ha but half area of Sub-group1	Some 2 to 4 ESU and some >100ESU	Farms employing 30% ELF, holders working full-time (age 44-54 years)	lowest
3	Oilseed, rye, maize fodder, soft wheat, sugar beet	Almost all >50 ha	>100ESU	Sub-contracted farms employing 80% ELF	Medium (half of sub-group 1)
4	Soft wheat, vineyards, sugar beet, rye	From 10 to >50ha, equally distributed	40 to 100 ESU, 2 to 4 ESU	Farms employing 10% ELF, holders working full-time (age 44-54 years)	Medium (half of sub-group 1)

Table 3. Summary of the characteristics of the 4 homogeneous areas (sub-groups) shown in Figure 4

3 CONCLUSIONS AND PERSPECTIVES

The data compiled in the crop growth stage templates is clearly generalised as there are many uncertainties related to farmers' decisions and their dependence on suppliers/contractors, yearly weather variations, soil type, crop varieties used and other unknown factors. It is designed specifically for use in developing the MACRO and PRZM meta-modelling data and, if used outside the FOOTPRINT project, should be carefully cross-checked with local data.

The current dataset of unique combinations of NUTS level 2 and crop growth stages should be considered as a β version as all the data is being cross-checked with the FOOTPRINT project's partners.

Use of the set of socio-agronomic zones is currently under discussion. Because of the crude resolution of the data and its limited number of variables, the zones will not be used to try and modify pesticide applications used in the modelling or to refine the final agro-environmental scenarios that will be the end product of work package 2. Following discussion with the project's partners and stakeholders it is envisaged that the information will most likely be

used to inform the piloting and evaluation of the FOOTPRINT tools (work package 6) and to improve their communication and dissemination (work package 7). Further work to investigate the possibility of refining the zones and integrating the data with other studies on the socio-agronomic aspects of farm holdings in European countries will continue following completion of work package 2.

4 REFERENCES

EUROSTAT (2006). www.epp.eurostat.ec.europa.eu.

MOCA study. Crop Monographies on Candidate Countries. 2003. Final report. European Commission, Joint Research Centre, 440p.

Narciso G., Ragni P., and Venturi A. 1992. Agro meteorological aspect of crops in Italy, Spain and Greece. ECSC-EEC-EAEC, Brussels, Luxembourg.

Saur R., Strobel D., Stammeler G., and Scherer M. 2001. Development of Growth Stages of Crops in Different European Regions for the FOCUS Groundwater scenarios. Final report. BASF Aktiengesellschaft, AP Agricultural Products Division, 67114 Limburgerhof, Germany, 25p.

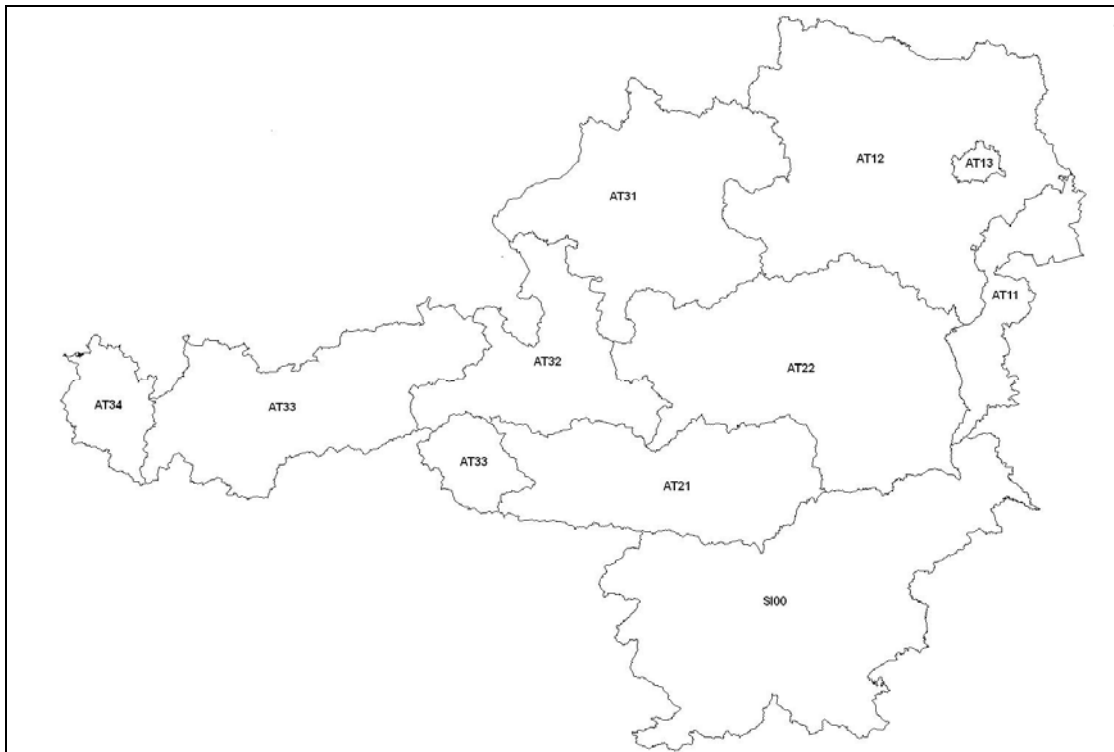
5 LIST OF ABBREVIATIONS

<i>AWU</i>	Annual Work Unit (equivalent to full employment)
<i>ESU</i>	European Size Unit (1 ESU=1200€of Standard Gross Margin)
<i>NUTS</i>	Nomenclature of Territorial Units for Statistics
<i>PCA</i>	Principal Component Analysis
<i>ELF</i>	External (non-family) labour force

Appendix 1

Maps of NUTS level 2 administrative units and their associated NUTS level 2 codes.

Austria and Slovenia



AT	Austria
AT11	Burgenland
AT12	Niederösterreich
AT13	Wien
AT21	Kärnten
AT22	Steiermark
AT31	Oberösterreich
AT32	Salzburg
AT33	Tirol
AT34	Vorarlberg
SI	Slovenia
SI00	Slovenija

Belgium and the Netherlands



BE Belgium

- BE00 Belgique / Belgie
- BE10 Reg.bruxelles-cap./brussels Hfdst. Gew.
- BE21 Antwerpen
- BE22 Limburg (b)
- BE23 Oost-vlaanderen
- BE24 Vlaams Brabant
- BE25 West-vlaanderen
- BE31 Brabant Wallon
- BE32 Hainaut
- BE33 Liege
- BE34 Luxembourg (b)
- BE35 Namur

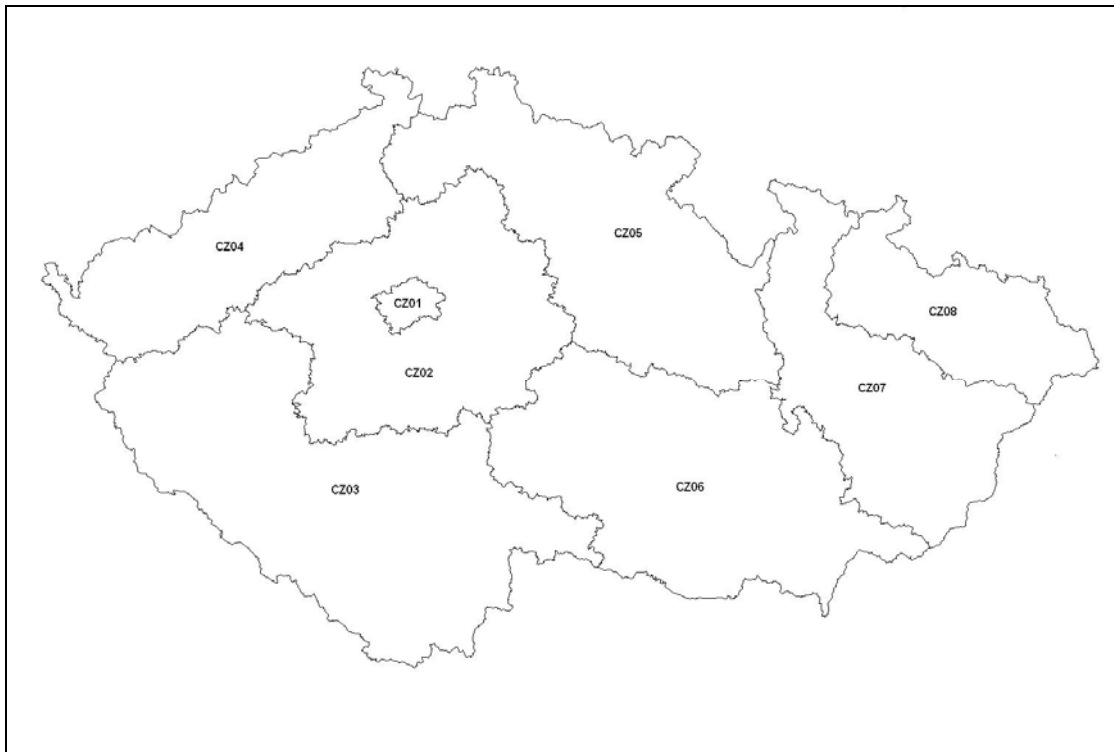
NL The Netherlands

- NL11 Groningen
- NL12 Friesland
- NL13 Drenthe
- NL21 Overijssel
- NL22 Gelderland
- NL23 Flevoland
- NL31 Utrecht
- NL32 Noord-holland
- NL33 Zuid-holland
- NL34 Zeeland
- NL41 Noord-brabant
- NL42 Limburg (nl)

LU Luxembourg

- LU00 Luxembourg (grand-duche)

Czech Republic



- CZ** **Czech Republic**
- CZ01 Praha
- CZ02 Stredni Cechy
- CZ03 Jihozapad
- CZ04 Severozapad
- CZ05 Severovychod
- CZ06 Jihovychod
- CZ07 Stredni Morava
- CZ08 Moravskoslezsko

Denmark



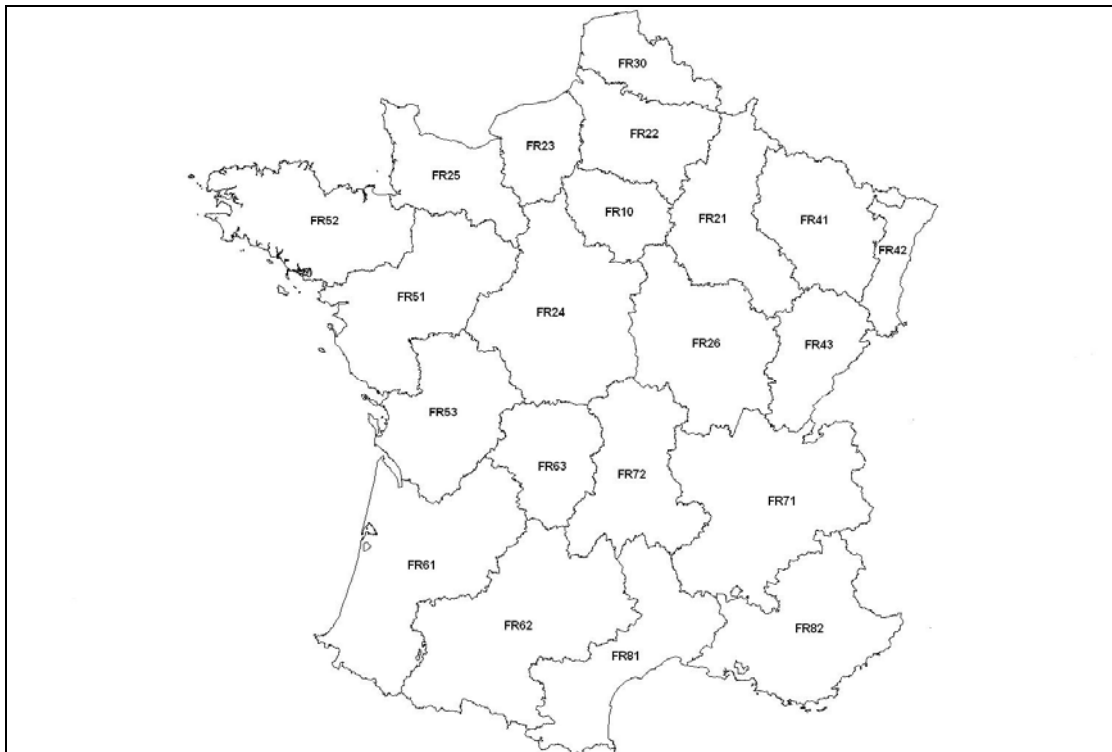
DK Denmark
DK00 Denmark

Estonia, Latvia, and Lithuania



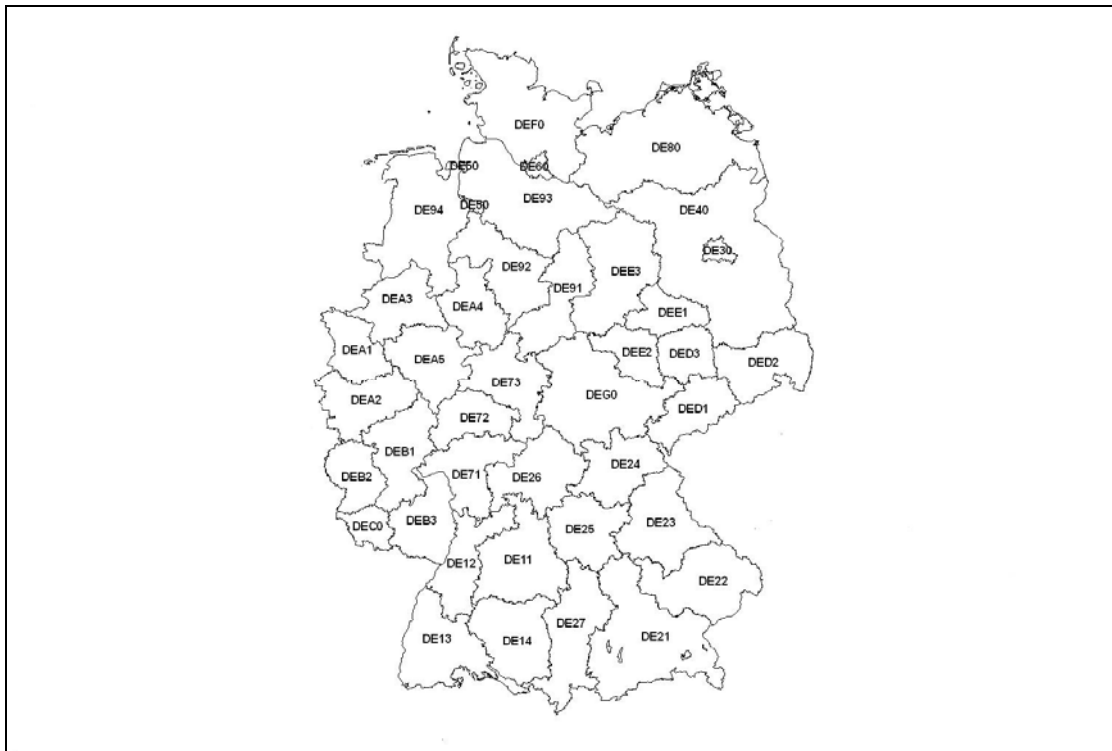
EE	Estonia
EE00	Eesti
LV	Latvia
LV00	Latvija
LT	Lithuania
LT00	Lietuva

France



FR	France
FR10	Ile De France
FR21	Champagne-ardenne
FR22	Picardie
FR23	Haute-normandie
FR24	Centre
FR25	Basse-normandie
FR26	Bourgogne
FR30	Nord-pas-de-calais
FR41	Lorraine
FR42	Alsace
FR43	Franche-comte
FR51	Pays De La Loire
FR52	Bretagne
FR53	Poitou-charentes
FR61	Aquitaine
FR62	Midi-pyrenees
FR63	Limousin
FR71	Rhone-alpes
FR72	Auvergne
FR81	Languedoc-roussillon
FR82	Provence-alpes-cote D'azur
FR83	Corse
FR91	Guadeloupe
FR92	Martinique
FR93	Guyane
FR94	Reunion

Germany



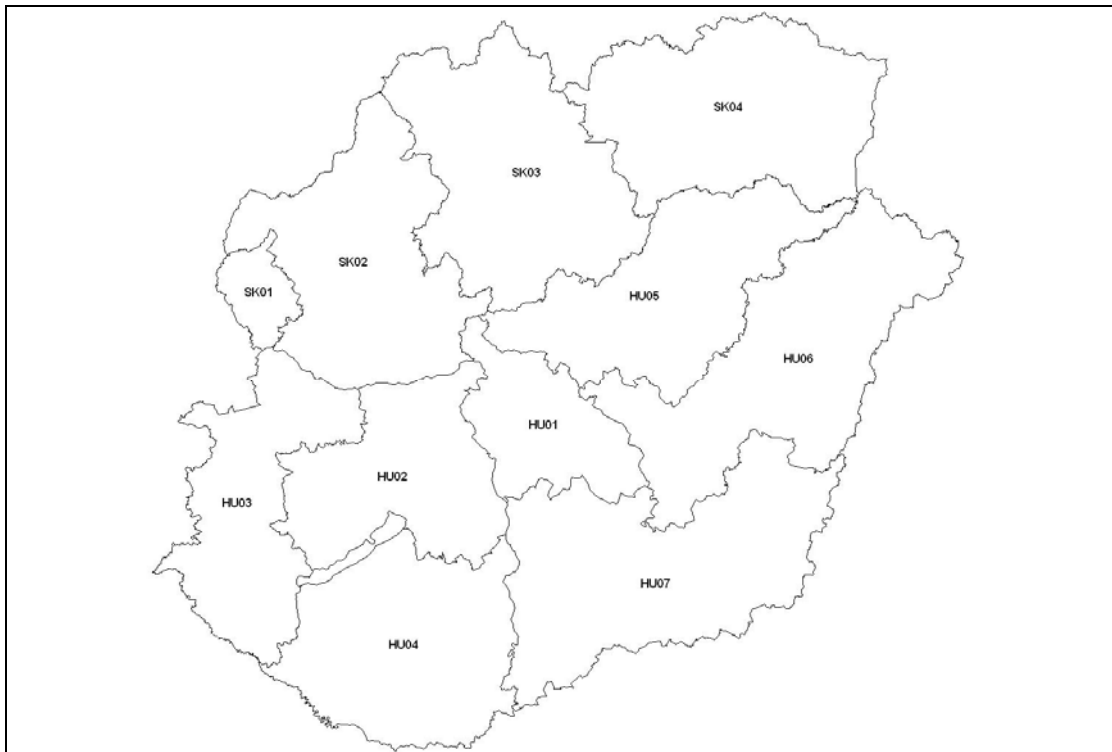
DE	Germany		
DE11	Stuttgart	DEB3	Rheinessen-pfalz
DE12	Karlsruhe	DEC0	Saarland
DE13	Freiburg	DED1	Chemnitz
DE14	Tuebingen	DED2	Dresden
DE21	Oberbayern	DED3	Leipzig
DE22	Niederbayern	DEE1	Dessau
DE23	Oberpfalz	DEE2	Halle
DE24	Oberfranken	DEE3	Magdeburg
DE25	Mittelfranken	DEF0	Schleswig-holstein
DE26	Unterfranken	DEG0	Thuringen
DE27	Schwaben		
DE30	Berlin		
DE40	Brandenburg		
DE50	Bremen		
DE60	Hamburg		
DE71	Darmstadt		
DE72	Giessen		
DE73	Kassel		
DE80	Mecklenburg-vorpommern		
DE91	Braunschweig		
DE92	Hannover		
DE93	Lueneburg		
DE94	Weser-Ems		
DEA1	Duesseldorf		
DEA2	Koeln		
DEA3	Muenster		
DEA4	Detmold		
DEA5	Arnsberg		
DEB1	Koblenz		
DEB2	Trier		

Greece



- GR Greece**
- GR11 Anatoliki Makedonia, Thraki
 - GR12 Kentriki Makedonia
 - GR13 Dytiki Makedonia
 - GR14 Thessalia
 - GR21 Ipeiros
 - GR22 Ionia Nisia
 - GR23 Dytiki Ellada
 - GR24 Stereia Ellada
 - GR25 Peloponnisos
 - GR30 Attiki
 - GR41 Voreio Aigaio
 - GR42 Notio Aigaio
 - GR43 Kriti

Hungary and Slovakia



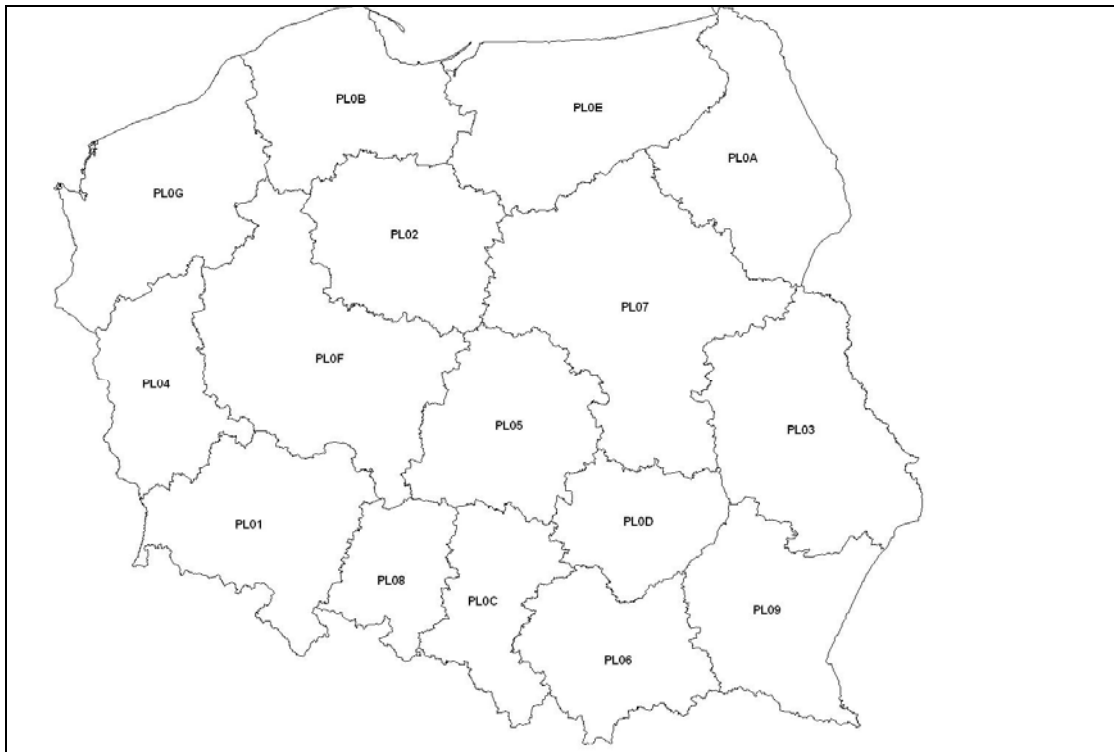
- HU Hungary**
 HU01 Közép-magyarország
 HU02 Közép-dunántul
 HU03 Nyugat-dunántul
 HU04 Dél-dunántul
 HU05 Észak-magyarország
 HU06 Észak-alföld
 HU07 Dél-alföld
- SK Slovakia**
 SK01 Bratislavský
 SK02 Západné Slovensko
 SK03 Stredné Slovensko
 SK04 Východné Slovensko

Italy and Malta



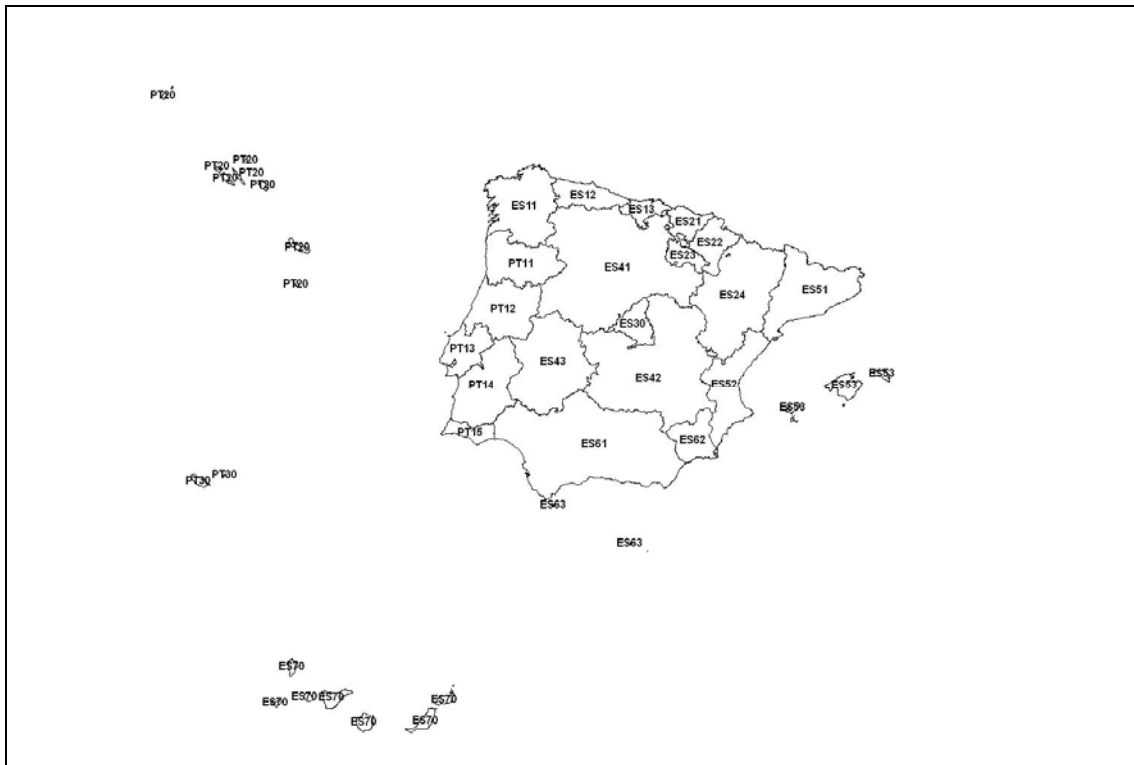
IT	Italy
IT11	Piemonte
IT12	Valle D'aosta
IT13	Liguria
IT20	Lombardia
IT31	Trentino-alto Adige
IT32	Veneto
IT33	Friuli-venezia Giulia
IT40	Emilia-romagna
IT51	Toscana
IT52	Umbria
IT53	Marche
IT60	Lazio
IT71	Abruzzo
IT72	Molise
IT80	Campania
IT91	Puglia
IT92	Basilicata
IT93	Calabria
ITA0	Sicilia
ITB0	Sardegna
MT	Malta
MT00	Malta

Poland



PL	Poland
PL01	Dolnoslaskie
PL02	Kujawsko-pomorskie
PL03	Lubelskie
PL04	Lubuskie
PL05	Lodzkie
PL06	Malopolskie
PL07	Mazowieckie
PL08	Opolskie
PL09	Podkarpackie
PL0A	Podlaskie
PL0B	Pomorskie
PL0C	Slaskie
PL0D	Swietokrzyskie
PL0E	Warminsko-mazurskie
PL0F	Wielkopolskie
PL0G	Zachodniopomorskie

Spain and Portugal



ES	Spain	PT	Portugal
ES11	Galicia	PT11	Norte
ES12	Asturias	PT12	Centro (p)
ES13	Cantabria	PT13	Lisboa E Vale Do Tejo
ES21	Pais Vasco	PT14	Alentejo
ES22	Navarra	PT15	Algarve
ES23	La Rioja	PT20	Acores
ES24	Aragon	PT30	Madeira
ES30	Comunidad De Madrid		
ES41	Castilla Y Leon		
ES42	Castilla-la Mancha		
ES43	Extremadura		
ES51	Cataluna		
ES52	Comunidad Valenciana		
ES53	Illes Balears		
ES61	Andalucia		
ES62	Region De Murcia		
ES63	Ceuta Y Melilla		
ES70	Canarias		

Sweden and Finland



- | | |
|-----------|----------------------|
| SE | Sweden |
| SE01 | Stockholm |
| SE02 | Oestra Mellansverige |
| SE04 | Sydsverige |
| SE06 | Norra Mellansverige |
| SE07 | Mellersta Norrland |
| SE08 | Oevre Norrland |
| SE09 | Smaaland Med Oearna |
| SE0A | Vaestsverige |
| FI | Finland |
| FI13 | Ita-suomi |
| FI14 | Vali-suomi |
| FI15 | Pohjois-suomi |
| FI16 | Uusimaa |
| FI17 | Etela-suomi |
| FI20 | Aaland |

United Kingdom and Ireland



UK United Kingdom

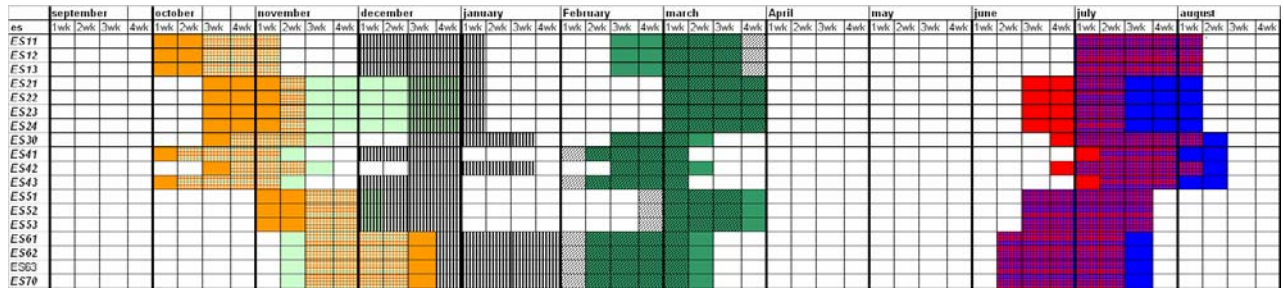
UKC1	Tees Valley & Durham	UKK4	Devon
UKC2	Northumberland And Tyne & Wear	UKL1	West Wales & The Valleys
UKD1	Cumbria	UKL2	East Wales
UKD2	Cheshire	UKM1	North East Scotland
UKD3	Greater Manchester	UKM2	Eastern Scotland
UKD4	Lancashire	UKM3	South Western Scotland
UKD5	Merseyside	UKM4	Highlands And Islands
UKE1	East Riding & North Lincolnshire	UKN0	Northern Ireland
UKE2	North Yorkshire	IE	Ireland
UKE3	South Yorkshire	IE01	Border, Midlands And Western
UKE4	West Yorkshire	IE02	Southern And Eastern
UKF1	Derbyshire & Nottinghamshire		
UKF2	Leicestershire, Rutland & Northants		
UKF3	Lincolnshire		
UKG1	Herefordshire, Worcestershire & Warks		
UKG2	Shropshire & Staffordshire		
UKG3	West Midlands		
UKH1	East Anglia		
UKH2	Bedfordshire & Hertfordshire		
UKH3	Essex		
UKI1	Inner London		
UKI2	Outer London		
UKJ1	Berkshire, Bucks & Oxfordshire		
UKJ2	Surrey, East & West Sussex		
UKJ3	Hampshire & Isle Of Wight		
UKJ4	Kent		
UKK1	Gloucestershire, Wiltshire & North Somerset		
UKK2	Dorset & Somerset		
UKK3	Cornwall & Isles Of Scilly		

Appendix 2

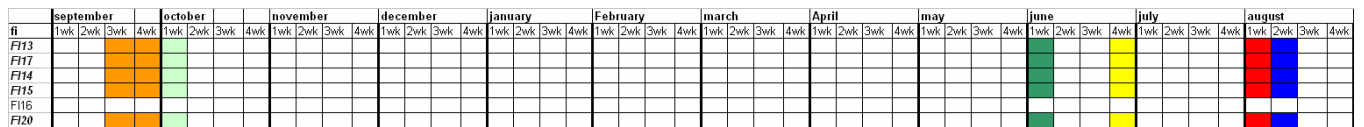
Example of Soft wheat (winter) growth stages for Europe

Sowing, germination, shooting or stem elongation, flowering, maturity, and harvest have been considered; application dates of pesticides are also included.

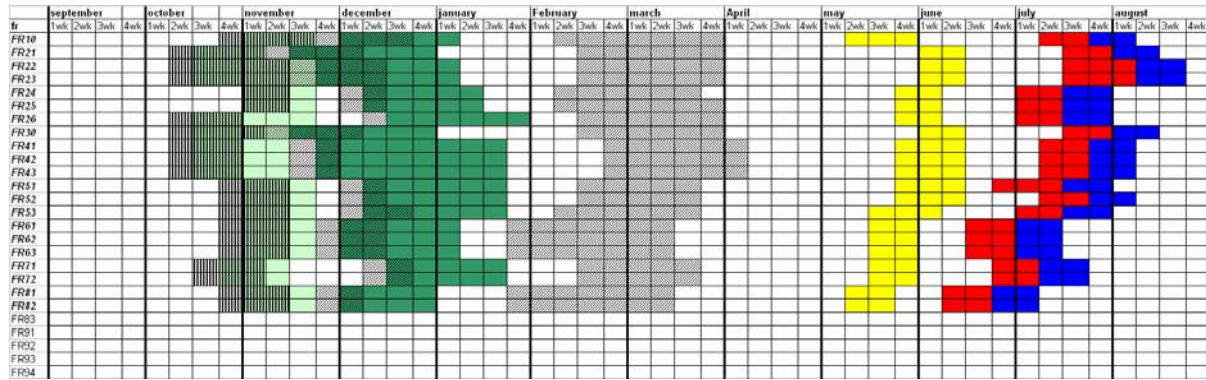
Spain



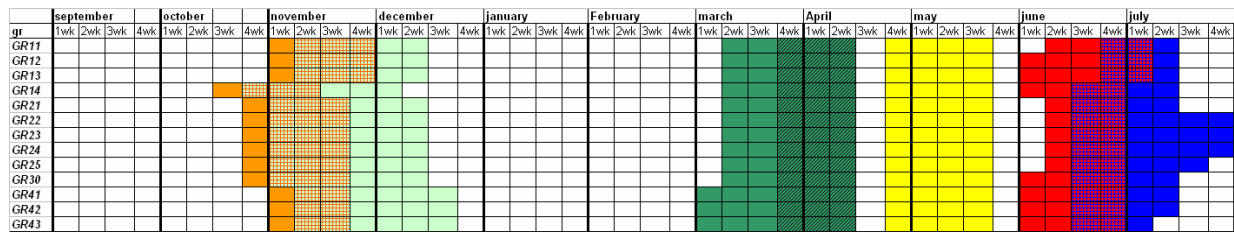
Finland



France



Greece



Hungary

hu	september				october				november				december				january				February				march				April				may				june			
	1wk	2wk	3wk	4wk	1wk	2wk	3wk	4wk	1wk	2wk	3wk	4wk	1wk	2wk	3wk	4wk	1wk	2wk	3wk	4wk	1wk	2wk	3wk	4wk	1wk	2wk	3wk	4wk	1wk	2wk	3wk	4wk	1wk	2wk	3wk	4wk				
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HU02																																								
HU03																																								
HU04																																								
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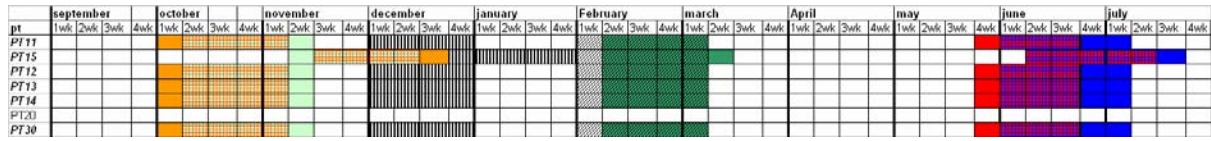


Italy

it	september				october				november				december				january				February				march				April				may				june				july			
	1wk	2wk	3wk	4wk	1wk	2wk	3wk	4wk	1wk	2wk	3wk	4wk	1wk	2wk	3wk	4wk	1wk	2wk	3wk	4wk	1wk	2wk	3wk	4wk	1wk	2wk	3wk	4wk	1wk	2wk	3wk	4wk	1wk	2wk	3wk	4wk								
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ITD0																																												



Portugal



Sweden



Slovenia



