WG1: Mushrooms & truffles

COST Action FP1203

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COST Action FP1203

European Non-Wood Forest Products (NWFPs) Network

2nd Workshop and 3rd Management Committee Meeting

Working Group 1 session - Mushrooms and truffles

Portuguese Mushroom and Truffles - Actual situation

Celeste Santos e Silva
Universidade de Évora -
ICAAM
Portugal

Krakow, Poland, 20 February 2014

Harvesting wild mushrooms and truffles was never a very widespread activity

Mushroom collectors were always members of rural populations

Wild mushrooms were traditionally picked for self-consumption

No authorization or certification was required

Over the past two decades, mushrooms picking for commercial purposes has increased considerably.
The vast majority of harvested mushrooms are directed towards foreign markets
Species most regularly collected are:

Although art. 1276 and 1311 from Civil Code, **forbids picking wild forest products on private property**…

…mushroom picking is still done without the minimal control

Few studies about edible mushrooms natural production
and
difficulties to quantify business volume

(illegal harvesting and commercialization)

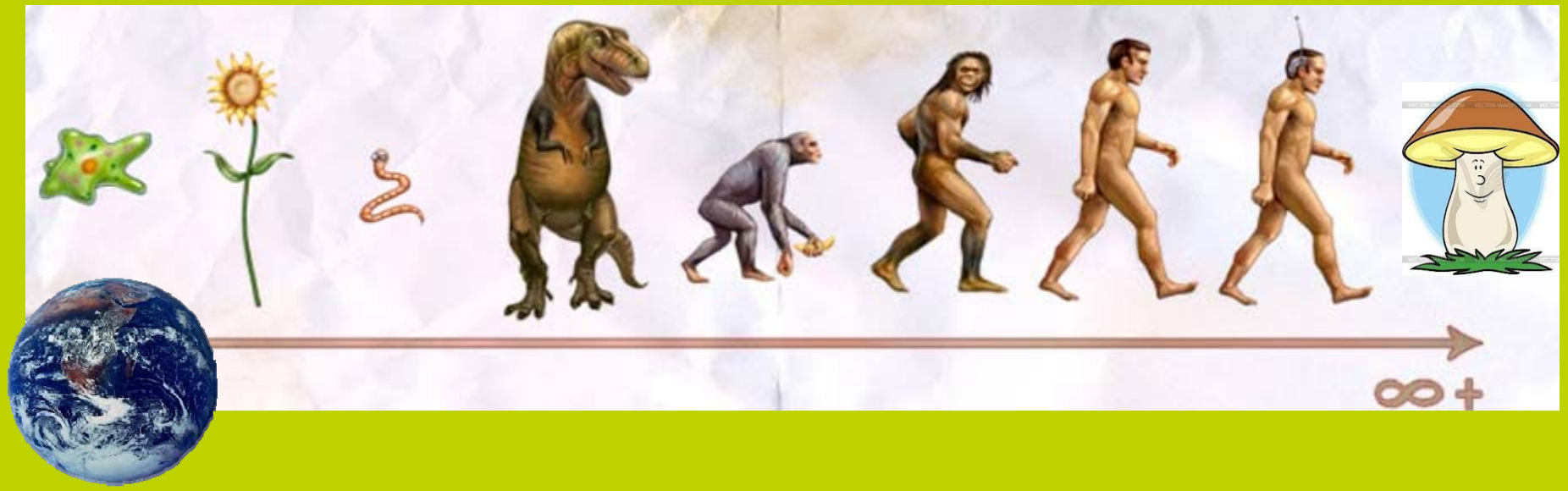
Approximately 500-600 ton/year of edible mushrooms are picked

Corresponding to 3 millions of euros

- **Human health** : Anyone can pick mushrooms to auto consumption and/or sale

- **Environment health**: Indiscriminate and intense picking of some mushrooms species disregarding good practices

- **Economical health**: Most land-owners do not profits with the mushrooms business



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COST Action FP1203 – NWFPs network
Meeting – Krakow, 20-21 February, 2014

MACEDONIAN MACROFUNGI (mushrooms and truffles)

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MSc Forest Policy and Economics, Skopje, Macedonia
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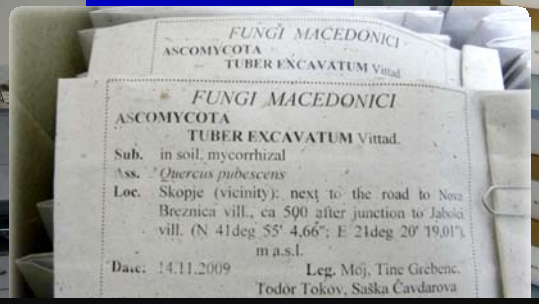
Mycological Research in Macedonia

- First data: Ranojevic (1909)
- Then follow: Sydow (1921) (works on Bornmuller's collection)
  - Litschauer (1939)
  - Lindtner (1938-1959)
  - Tortic (1975-1988)
  - Karadelev (1986 – to date)
- Intensive research from 1990 onwards
- **Mycological Laboratory established in 2001, including:**
  - Mycological database MACFUNGI: >40,000 specimens
  - Macedonian Collection of Fungi (MCF): >20,000 specimens



MACEDONIAN MYCOLOGICAL SOCIETY
www.macfungi.webs.com

Current situation of MACROMYCETES

Types of fungi	Families	Taxa genera	Species
Ascomycota (without lichens)	48	83	250
Basidiomycota	54	312	1,870
Total	110	378	**2,120**

TRADED SPECIES

Species	Distribution	Uses	Markets
Amanita caesarea	European – wide	marketed species	traded
Boletus aereus	European – wide	marketed species	traded
Boletus reticulatus	European – wide	marketed species	traded
Calocybe gambosa	European – wide	marketed species	traded
Cantharellus cibarius	European – wide	marketed species	traded
Lactarius deliciosus	European – wide	marketed species	traded
Marasmius oreades	European – wide	marketed species	traded
Morchella esculenta	European – wide	marketed species	traded
Morchella conica	European – wide	marketed species	traded
Suillus granulatus	European – wide	marketed species	traded
Tricholoma terreum	European – wide	marketed species	traded

(NOT YET) MARKETED SPECIES

Species	Distribution	Uses	Markets
Amanita rubescens	European – wide	edible but (not yet) marketed	picked as food but not necessarily threaten
Agaricus campestris	European – wide	edible but (not yet) marketed	picked as food but not necessarily threaten
Agrocybe cylindracea	European – wide	edible but (not yet) marketed	picked as food but not necessarily threaten
Armillaria mellea	European – wide	edible but (not yet) marketed	picked as food but not necessarily threaten
Coprinus comatus	European – wide	edible but (not yet) marketed	picked as food but not necessarily threaten
Macrolepiota procera	European – wide	edible but (not yet) marketed	picked as food but not necessarily threaten
Pleurotus ostreatus	European – wide	edible but (not yet) marketed	picked as food but not necessarily threaten
Pleurotus eryngii	European – wide	edible but (not yet) marketed	picked as food but not necessarily threaten
Tuber aestivum	European – wide	edible but (not yet) marketed	?

Economical aspects

- **Complete export orientation - 95% from the production**
- **Wild MAPs/NWFP are exported mostly as raw material**

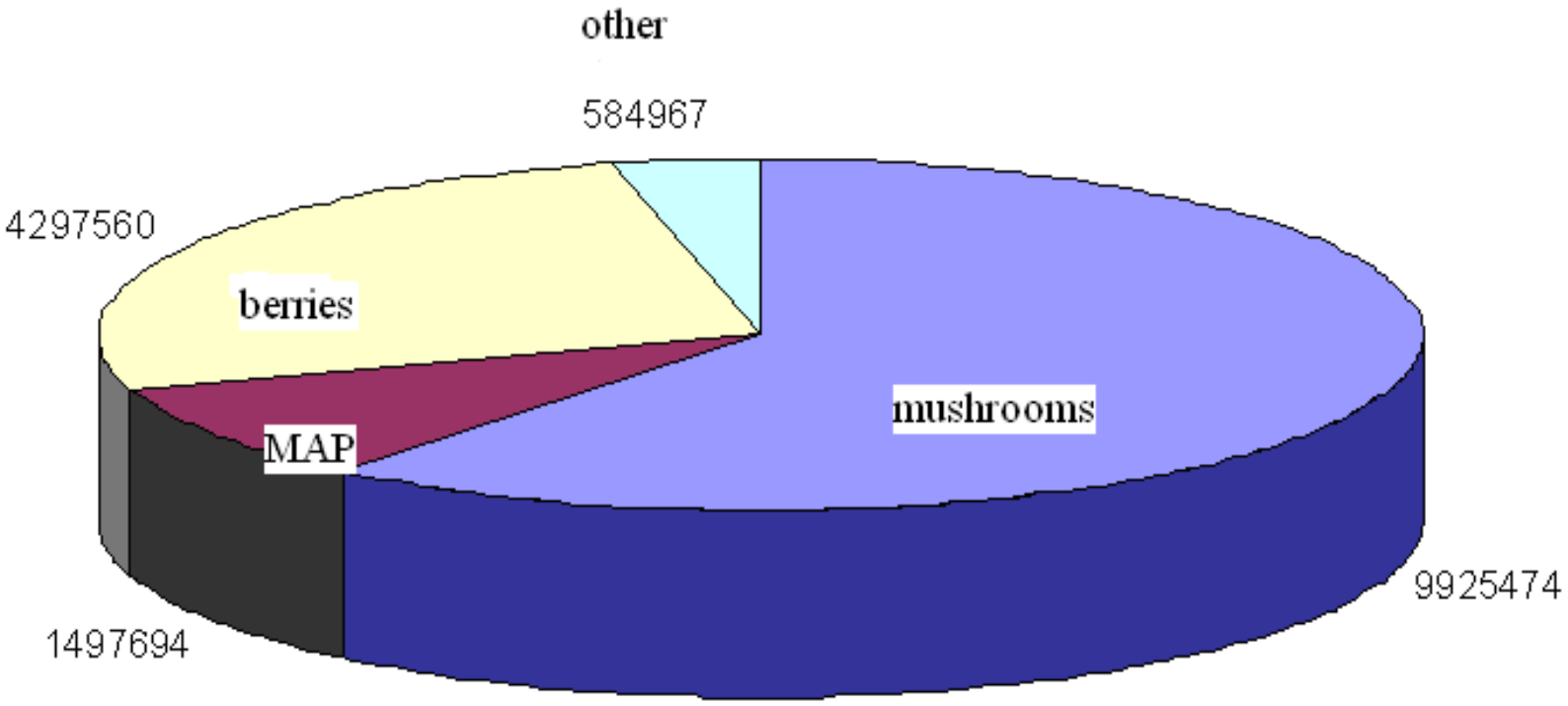
The annual export of MAPs/NWFPs from 2004-2008 expressed in million US $

** Source of information: Macedonian State Statistical Office*

MAPs/NWFPs from Macedonia are mostly exported in

Distribution of the export of MAPs/NWFPs in 2008 expresses in million US $

- Mushrooms represent more than 60 % of the total value of WGP exports
- Mainly from the genera *Boletus*, *Lactarius* and *Cantharellus*
- About 70 % of total mushrooms exports from Macedonia are dried, followed by frozen, in brine and fresh

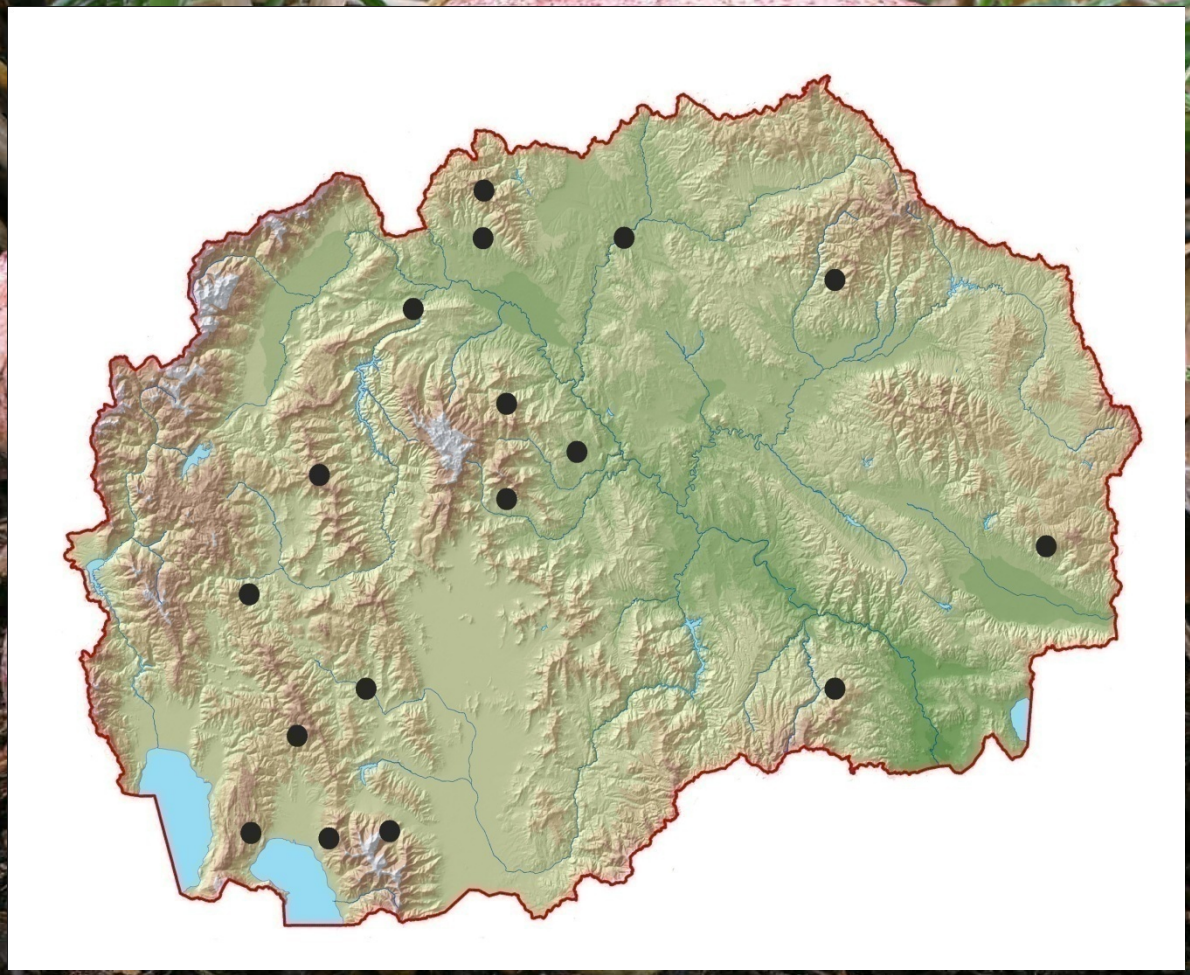


2008 Export US

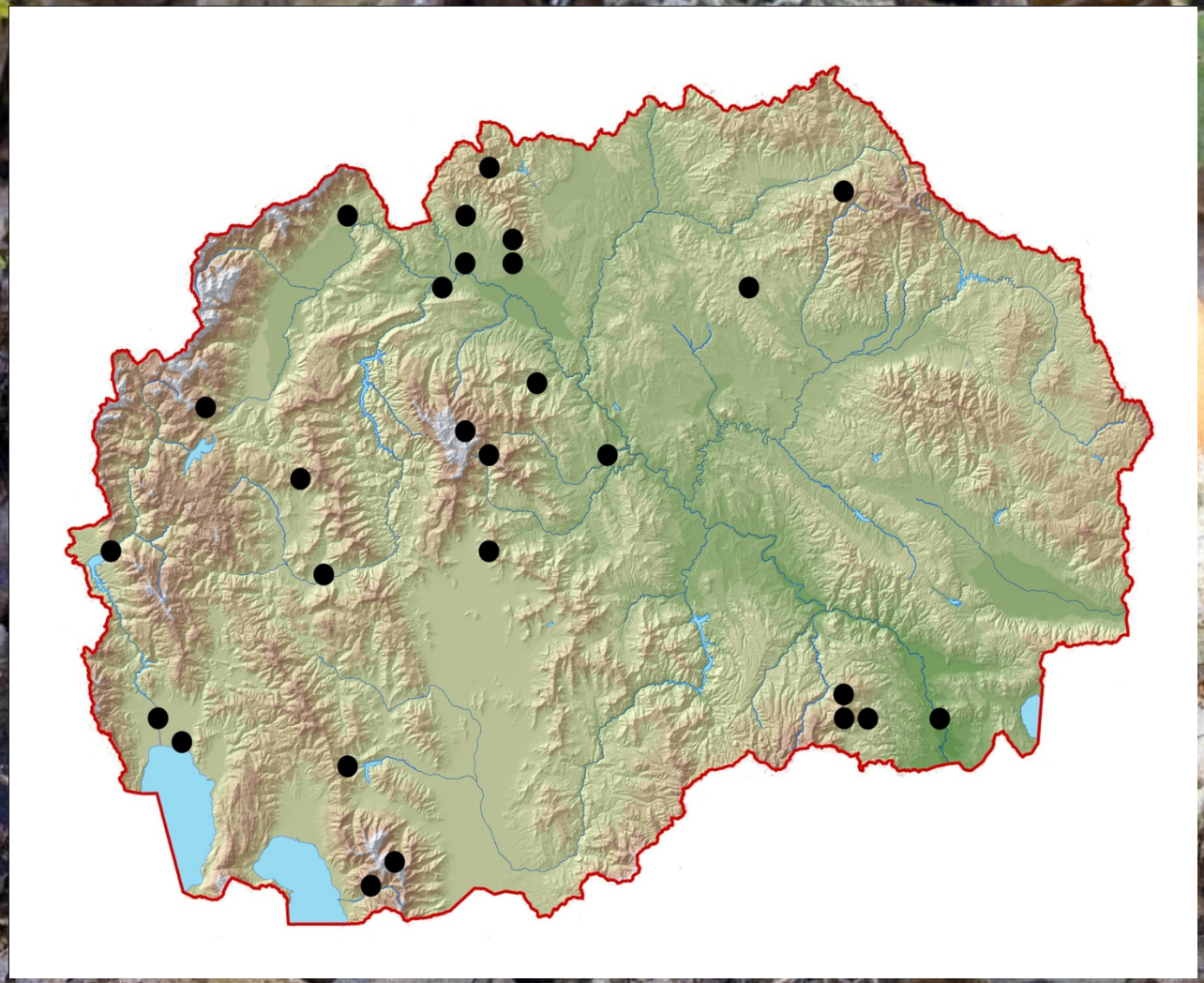
ANTRODIA JUNIPERINA : CR - C2a(i)

Battarrea phalloides : CR - B2ab(iv)

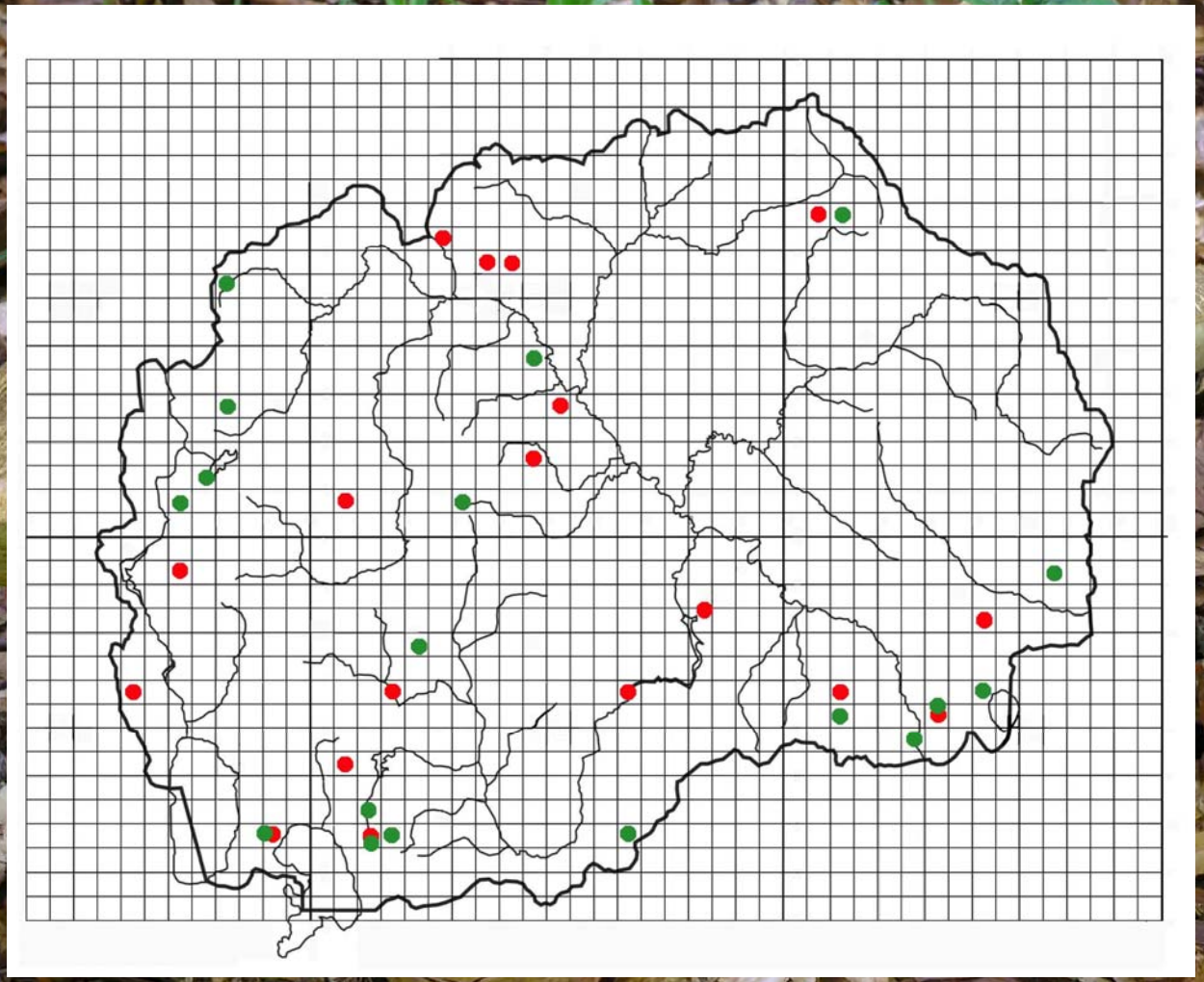
Boletus regius : VU - C1



Amanita caesarea VU - A2acd



Boletus reticulatus



Boletus aereus : **VU - A2acd**


Thank you for your attention!

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Mushrooms & truffles in Greece

Kalliopi Stara, Department of Biological Application and Technology, University of Ioannina, Greece

European non-wood forest products (NWFPs) network COST Action FP1203

Krakow Poland

20. - 21. February 2014

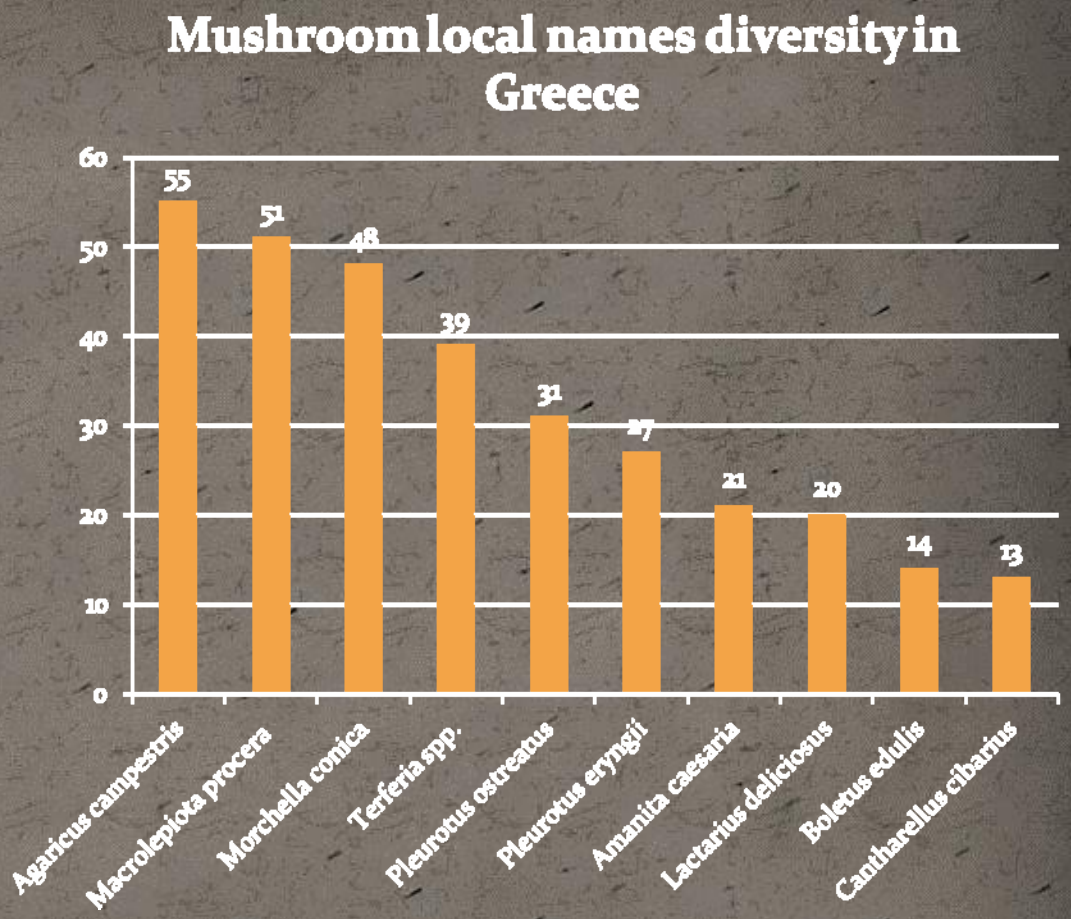
The commonest edible species

Commonest edible species

Amanita caesaria,
Agaricus campestris, Agaricus arvensis,
Boletus edulis,
*Pleurotus ostreatus (*Diamantis (1992)

Species with commercial interest

Boletus spp. (B. aereus, B. reticulatus, B. edulis)
Amanita caesaria
Cantharellus cibarius
Morchella spp. (Konstantinidis 2002)



Adapted from Keltemlidis 1993

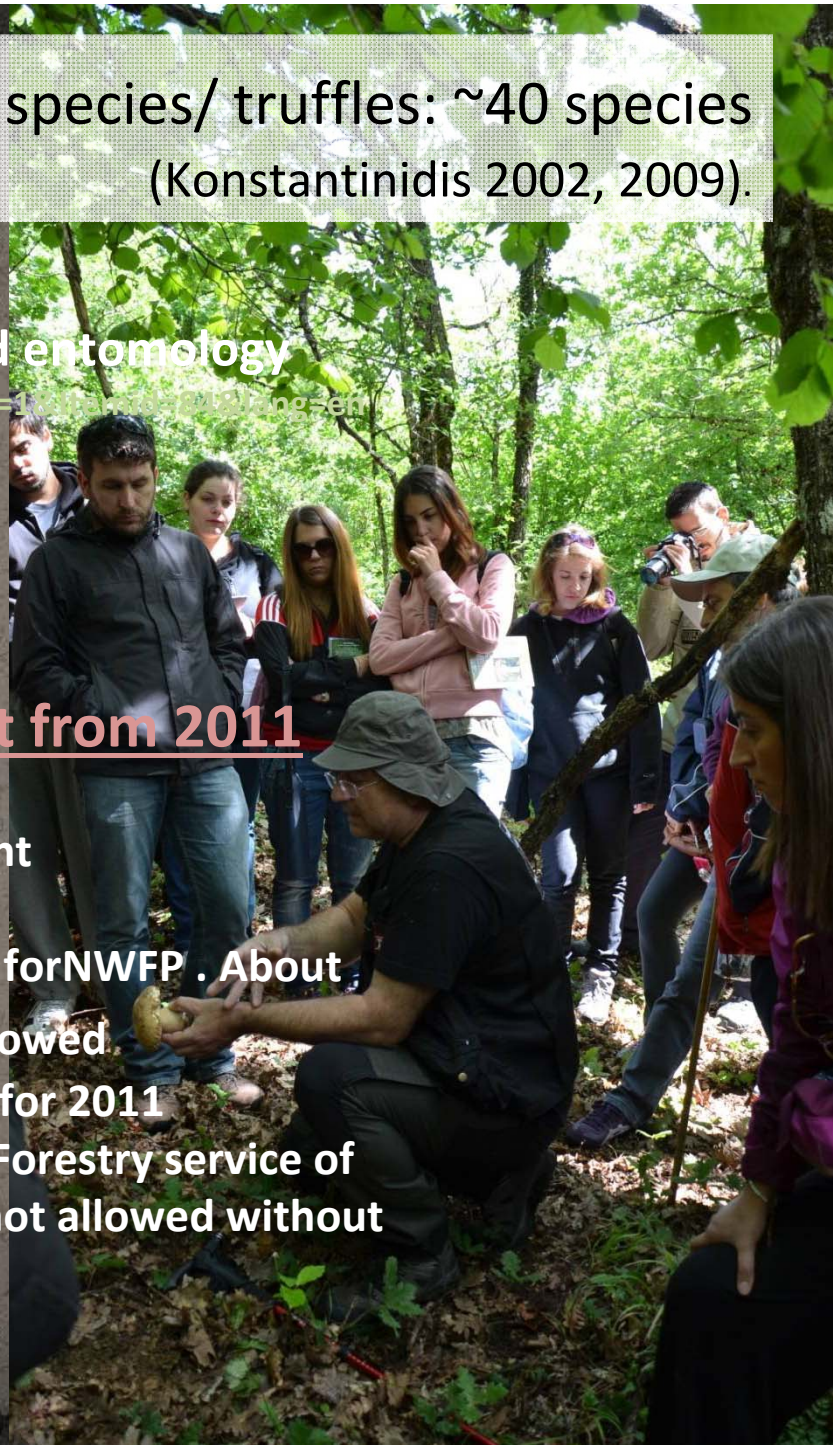
Diversity: Mushrooms:~2.000 species/ truffles: ~40 species (Konstantinidis 2002, 2009).

Research

- **Forest Research Institute: Forest pathology and entomology**
  http://www.fri.gr/index.php?option=com_content&view=article&id=1[illegible]ng-en
- **University of Athens: Mycethotheca AUTHUM**
  http://en.mycetotheca.biol.uoa.gr/
- **Mushroom clubs:** http://www.manitari.gr/

Legislation: No national legislation…. but from 2011

- **Mushrooms are included in Table of prices assessment about forest products**
- **Regional forestry services release annual regulations forNWFP . About mushrooms: 2 (and rarely 3) kilos/day/person are allowed**
- **Permissions for Commercial use: e.g. 200 -1000 kilos for 2011**
- **No species are mentioned with the exception of the Forestry service of Ioannina where the collection of all truffle species is not allowed without permission**



Grevena the city of mushrooms

Epirus muschroom club festival 2011, Zagori

People, clubs, fashion

First mushroom club: 1998, today regional clubs in most Greece

Annual meetings and celebrations, mushroom hunting, public awareness events

BUT

Overharvesting eg *Cantharellus cibarius*

Forest fires and *Morchella spp. ?*

References

- Diamantis, S. 1992. The mushrooms of Greece. Ion, Athens [in Greek].
- Keltemlidis, D. 1993. Greek mushrooms and their local names. Folklore mycology. Psychalou editions [in Greek].
- Konstantinidis, G. 2009. Mushrooms. Collectors photo guide. Nonpaper.net, Grevena [in Greek].
- Konstantinidis, G. 2002. Mushrooms. A fairy mikrokosmos. KAPON, Athens [in Greek].

Acknowledgements

- Stefanos Diamantis, Forest Research Institute
- Vaggelis Fillis, Epirus mushroom club
- Evagellia Kapsanaki, University of Athens, Faculty of Ecology and Taxonomy
- Rigas Tsiakiris, Forestry Service of Ioannina

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Switzerland: Importance of forest mushrooms & tru

- Art. 699: All Swiss forests (public forests as well as private forests) are open to everybody. Everybody is allowed to pick mushrooms, berries, fruits.
- Mushrooms are the most popular NWFP‘s in Switzerland
- mostly private harvesting for self consumation
- ca. 75% of the marketed wild mushrooms are imported (Poland, Latvia, Romania, …)
- The 3 most important species harvested in Switzerland (estimated to represent 80% of the harvested mushrooms in Switzerland):

Boletus edulis

Cantharellus cibarius

Tuber aestivum syn. uncinatum

Switzerland: Data availability / data quality

Data available:

- for the 3 most important species on market: 254-735 t/year
  - Boletus edulis → 7-22 mio Euro/year
  - Cantharellus cibarius
  - Morels
- Other species :
  Burgundy truffles no data, but increasing market

- Perennial mushrooms (decoration material) no data

Data quality:

- no official statistics
- rough estimations based on data of officonal musroom control offices, n= 60)

Switzerland: Basic data

Boletus edulis, Cantharellus cibarius, and other edible species:

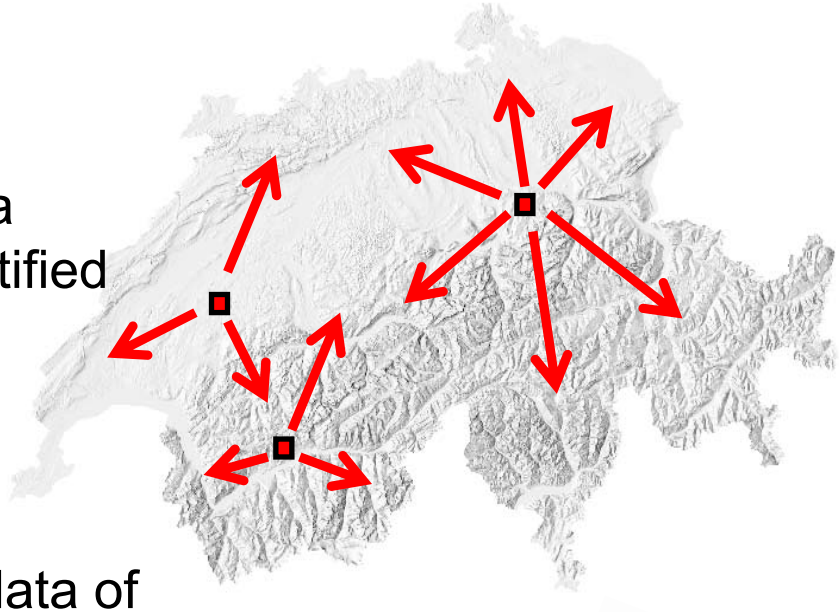
- good knowledge on ecology
- some knowledge on influence of forest management (e.g. effect of thinning)
- poor knowledge on economy & governance

Tuber aestivum:

- poor knowledge on ecolog
  new running research project in Switzerland on the ecology of the Burgundy truffle
- no knowledge on forest management
- no knowledge on economy & governance

Switzerland: recommendations to amelioriate data quantity and quality

- extrapolation of local mycological inventories (e.g. Fungus Reserve La Chanéaz) to the whole country, stratified according to
  - forest type
  - tree species composition
  - …
- extrapolation of official harvesting data of official mushroom control offices (n= 60)



- Public-opinion poll (only mushroom harvesters) on harvesting details (species, quantities, …)

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Moroccan Wild Edible Mushrooms

Authors

Abourouh M.

Mounir F.

COST Action FP1203

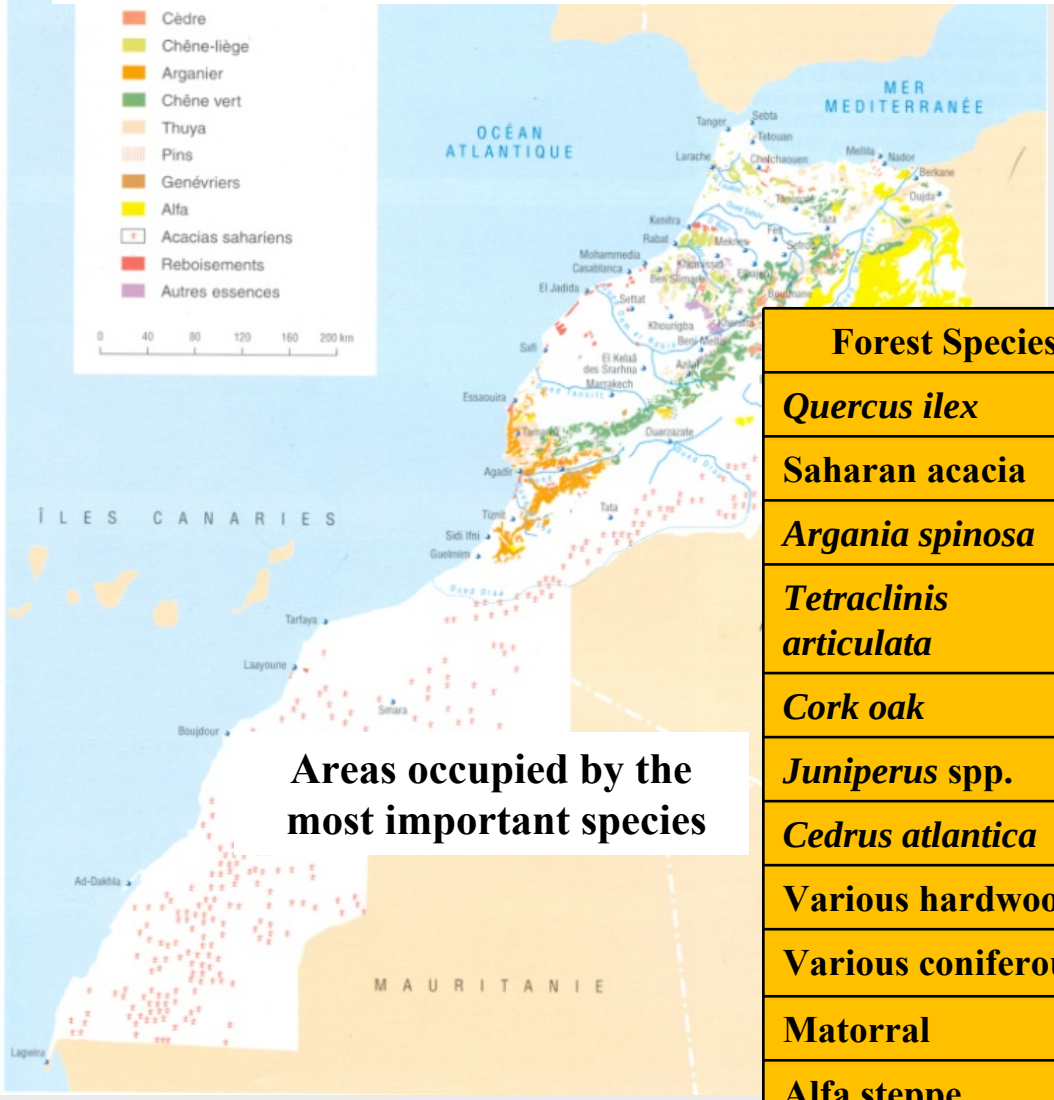
European Non-Wood Forest Products (NWFPs) Network

2nd Workshop and 3rd Management Committee Meeting

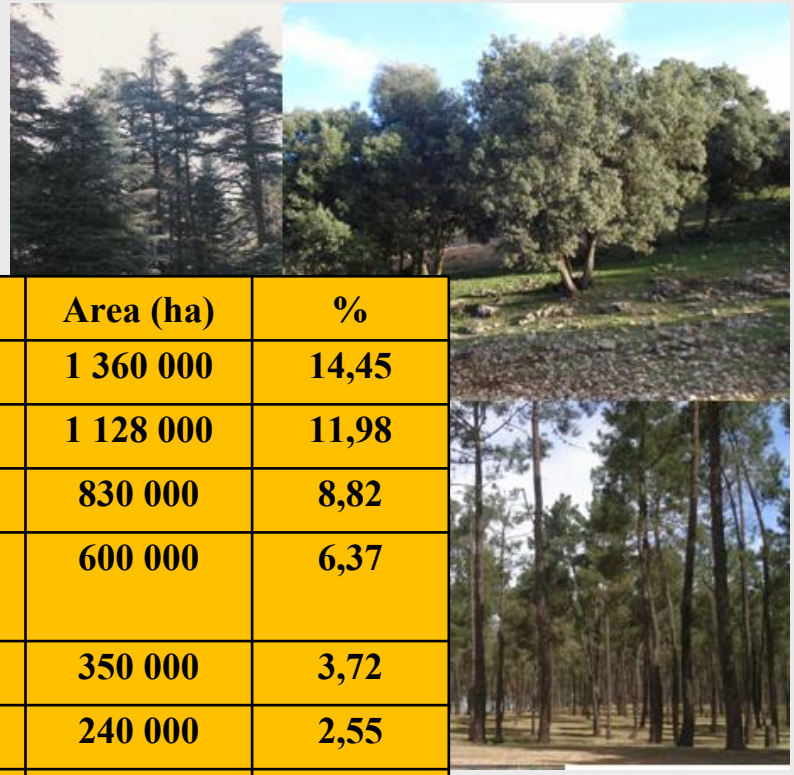
20-21 February 2014

Krakow, Poland

Morocco is subject to a Mediterranean climate, with a rainy, cool or cold autumn-winter, followed by a long hot dry season (four months in the mountains and five to six months in the plains).



Areas occupied by the most important species



Forest Species	Area (ha)	%
Quercus ilex	1 360 000	14,45
Saharan acacia	1 128 000	11,98
Argania spinosa	830 000	8,82
Tetraclinis articulata	600 000	6,37
Cork oak	350 000	3,72
Juniperus spp.	240 000	2,55
Cedrus atlantica	132 000	1,40
Various hardwoods	426 000	4,53
Various coniferous	390 000	4,14
Matorral	958 000	10,18
Alfa steppe	3 000 000	31,87
Total	9 414 000	100,00

February 2014

Fungi are an integrated component of forest ecosystems.

They play a vital role in the ecology of all natural habitats and are beneficial to them.

Genera and species number of higher fungi known in Morocco (Abourouh, 2011).

Genera	Species number	Genera	Species number
Agaricus	33	*Mycena*	68
Amanita	41	*Morchella*	03
Boletus	16	*Peniophora*	18
Clitocybe	32	*Peziza*	08
Collybia	16	*Phellinus*	*09*
Conocybe	23	*Pholiota*	11
Coprinus	38	*Pleurotus*	12
Cortinarius	107	*Pluteus*	17
Entoloma	32	*Psathyrella*	28
Hebeloma	16	*Psilocybe*	08
Helvella	12	*Ramaria*	10
Hygrocybe	16	*Rhodocybe*	10
Hygrophorus	14	*Russula*	110
Inocybe	58	*Scleroderma*	07
Lactarius	40	*Suillus*	05
Lepiota	21	*Terfezia*	10
Lepista	11	*Tirmania*	02
Lycoperdon	07	*Tricholoma*	32
Lyophyllum	10	*Tomentella*	18
Marasmius	15	*Tuber*	05
Melanoleuca	17	*Xerocomus*	07

High diversity of species: 973.

Fungal flora where almost all temperate and mediterranean climates represents about 42 genera.

Some species are endemic, others are common with European southern countries. Dominance, however, of drought-tolerant species.

Most are inedible but some can be eaten [Wild Edible Fungi (WEF)].

Well known species occur in the genera:

Epigeous (mushroom and puffballs)

Family	Genus	Family	Genus
Amanitaceae	*Amanita*	*Geastraceae*	*Geastrum*
	Amanitopsis	*Gomphidiceae*	*Gomphidius*
Astracaceae	*Astraeus*	*Hydnaceae*	*Hydnum*
Boletaceae	*Boletus*	*Hygrphoraceae*	*Hygrocybe*
	Leccinum		*Hygrophorus*
	Suillus	*Paxillaceae*	*Paxillus*
	Xerocomus	*Pisolithaceae*	*Pisolithus*
Cantharellaceae	*Cantharellus*	*Rhodophyllaceae*	*Clitopilus*
	Craterellus	*Russulaceae*	*Lactarius*
Clavariaceae	*Clavaria*		*Russula*
	Ramaria	*Sclerodermaceae*	*Scleroderma*
Cortnariaceae	*Cortinarius*	*Thelephoraceae*	*Corticium*
	Descolea		*Thelephora*
	Hebeloma	*Tricholomaceae*	*Laccaria*
	Inocybe		*Tricholoma*

Hypogeous (truffles and false truffles)

Family	Genus
Boletaceae	*Rhizopogon*
Cortinariaceae	*Hymenogaster*
Helvellaceae	*Balsamia*
Hysterangiaceae	*Hysterangium*
Melanogastraceae	*Melanogaster*
Strobilomycetaceae	*Gautieria*
Tuberaceae	*Terfezia*
	Tirmania
	Tuber

Tricholoma caligatum
(White matsutake)

Robust mushroom, related to matsutake, strong odor, aromatic and sweet flavor; hard flesh, dense and white.

Abundant in the Rif region under *Cedrus atlantica* and *Pinus halepensis*, but commercial harvest is concentrated in the cedar forests (humid, cold winters).

Fruiting in September-November in cercles, some of which may contain tens of fruit-bodies.

Great culinary value.

Boletus Group
(*B. aereus* and *B. mamorensis*)
(ceps or boletes)

Fungi with stalk and pores on the underside of the cap.

Humid to sub-humid, cool to hot areas.

Under *Quercus suber*, Q. *ilex*, *Q. pyrenaica* and *Cistus* spp.

Main fruiting occurs in autumn-fall beginning, though spring fruiting sometimes are encountered.

Great culinary value.

February 2014

Cantharellus cibarius
(Golden chanterelle)

Yellow to golden-yellow, firm, odor faintly fruity, taste mild. May occur singly but often in clusters.

Under *Quercus suber* and *Q. ilex* in plains and mountains.

Humid to sub-humid, cold to temperate areas.

Fruits most commonly during late autumn-fall and even spring.

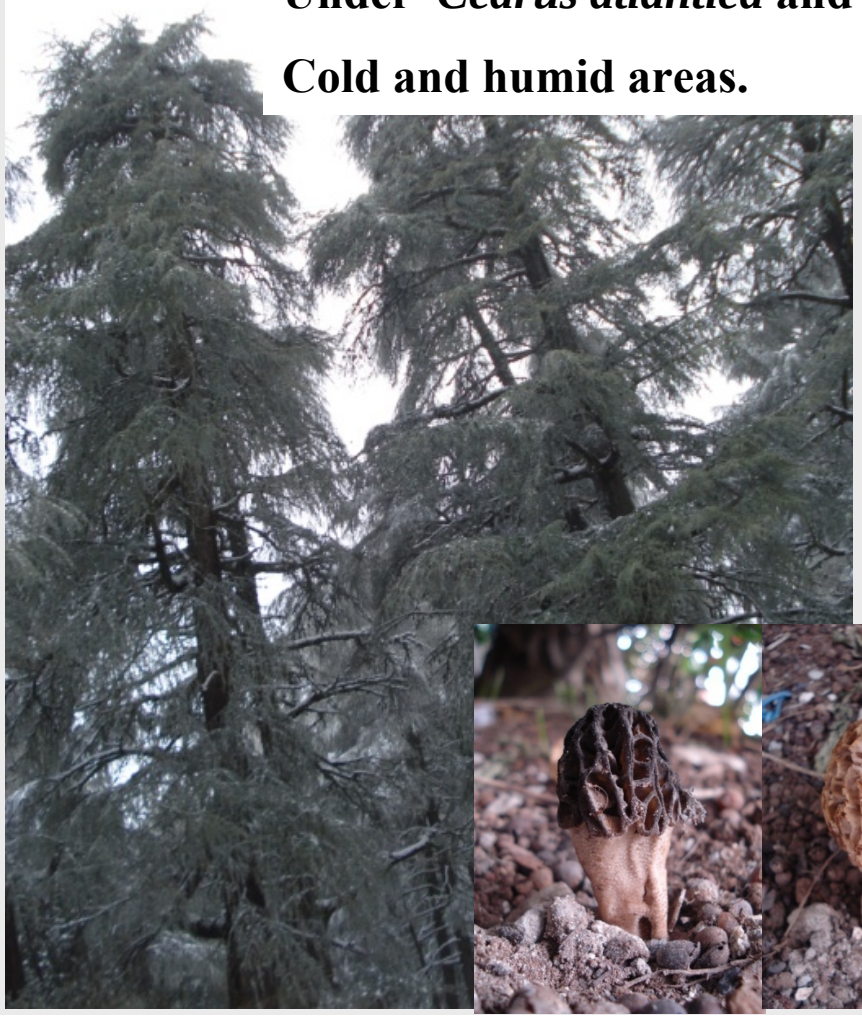
Great culinary value.

Morchella Group
(*M. conica* and *M. vulgaris*)

Distinctive mushrooms with a network of ridges with pits between them.

Under *Cedrus atlantica* and *Quercus ilex*.

Cold and humid areas.



February 2014

Terfezia and *Tirmania* species (Desert Truffles)

Under ground fruit-bodies, large, more or less spherical.

Endemic to arid and semi-arid areas, where they live in association with *Helianthemum* and *Cistus* species.

Maamora

Three production areas

Sahel

Oriental highlands, between 1 000 et 1 400 m.

Pleurotus ostreatus; P. eryngii; P. ferulae (Oyster mushrooms)

Large greyish beige mushrooms with a round funnel-shaped hat.

Grow in clusters on:

- the trunk of cork-oak trees;

- on roots of *Eryngium* and *Ferula* species.

Humid, subhumid, semi-arid, arid and desert climates.

Automnal.

Socio-economic aspects

Estimates suggest that hundreds of kilos of fresh WEM are harvested and exported annually.

The producing areas are all located in rural poor regions and revenue generated by harvesting is a particularly important source of income for the population.

Statistical data are scarce, imprecise and dificult to verify; field investigations difficult.

White matsutake and Desert truffles are economically the most important.

Almost all the species are exported fresh or canned:

- **§ white matsutake to Japan (61 tons/year);**
- **§ Boletes, Golden chanterelle and Morchella group (4 tons/year) to Europe and USA;**
- **§ Desert truffles to the Meadle East (about 700 tons/year).**

Is this resource sustainable?

Production of WEM has apparently declined in native ecosystems for a range of social and environmental reasons:

- overgrazing;

- clear-cutting;

- replacement with plantation crops (such as introduced pines and eucalypts);

- destructive manner when harvesting, as raking forest soil (desert truffle case).

Prospects

In order to protect and increase supply of WEM, the following approaches must be adopted:

- conservation of existing WEM biotopes;

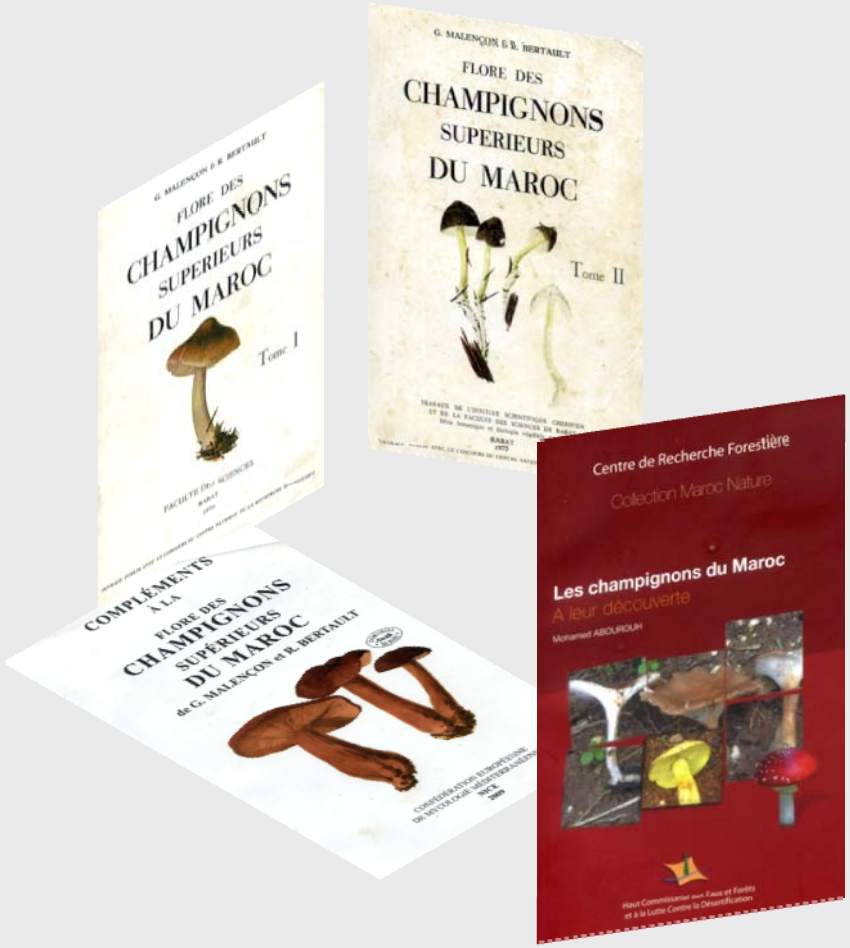
- extension of harvesting from the wild to non-traditional regions, via more investigation and people information;

- reforestation using inoculated seedlings with target WEM, specifically to produce fruit-bodies rather than timber;

- as perishable product, WEM require also marketing strategies;

- development of management approaches (as clearings and pruning, etc..) that will enhance or restore production in traditional harvesting areas.

Literature



- "Flore des champignons supérieurs du Maroc", by Malençon G. and Bartault R., published in two volumes, in 1970 and 1975.

- "Compléments à la Flore des champignons supérieurs du Maroc" , in 2009 by the "Confédération Européenne de Mycologie Méditerranéenne".

- "Les champignons du Maroc: à leur découverte" by Abourouh M. in 2011.

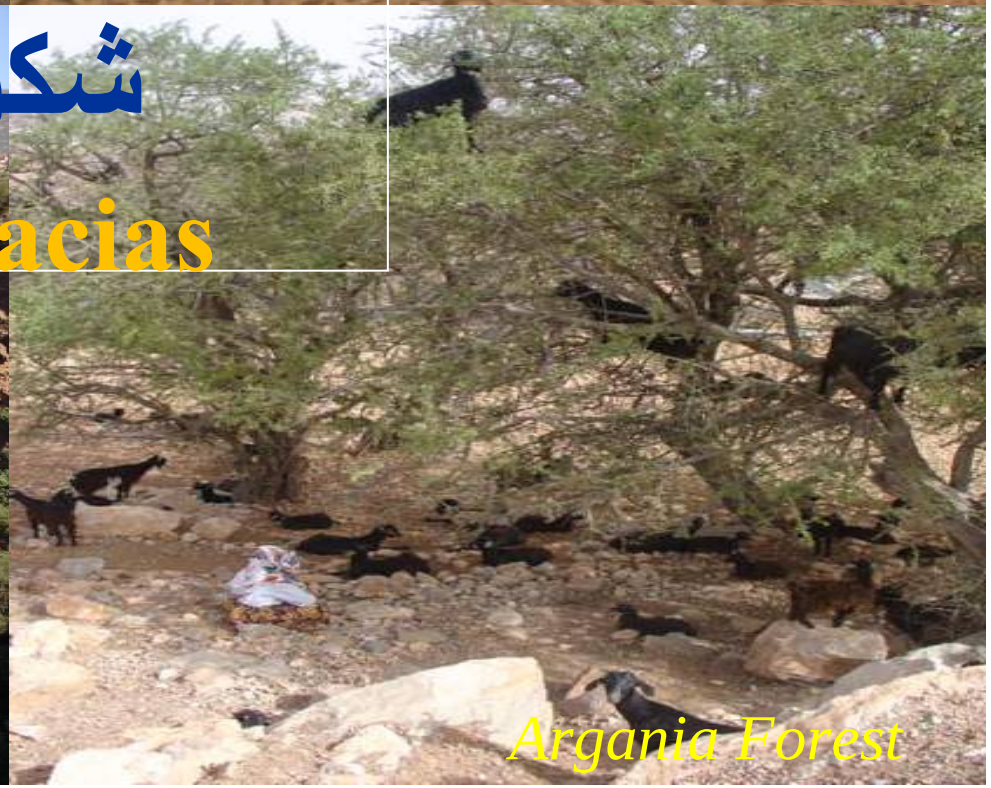
February 2014

Thank you

Merci

شكرا

Gracias



WG1: Mushrooms & truffles

COST Action FP1203

1. **14:15-14:20:** Mikko Kurtila (Finland)
2. **14:20 -14:25:** Miroslav Kovalcik (Slovakia)
3. **14:25 -14:30:** Pawel Staniszewski (Poland)
4. **14:30 -14:35:** Ljiljana Keca (Serbia)
5. **14:35 -14:40:** Lucian Dinca (Romania)
6. **14:40 -14:45:** Tine Grebenc (Slovenia)
7. **14:45 -14:50:** José Antonio Bonet (Spain)
8. **14:50 -14:55:** Željko Zgrablić (Croatia)
9. **14:55 -15:00:** Celeste Santos (Portugal)
10. **15:00 -15:05:** Vaska Nedanovska (FYRO Macedonia)
11. **15:05 -15:10:** Kalliopi Stara (Greece)
12. **15:10 -15:15:** José Antonio Bonet (for Simon Egli) (Switzerland)
13. **15:15 -15:20:** Fouad Mounir (Morocco)
14. **15:20 -15:25:** Davide Pettenella (Italy)

COST Action NWFP

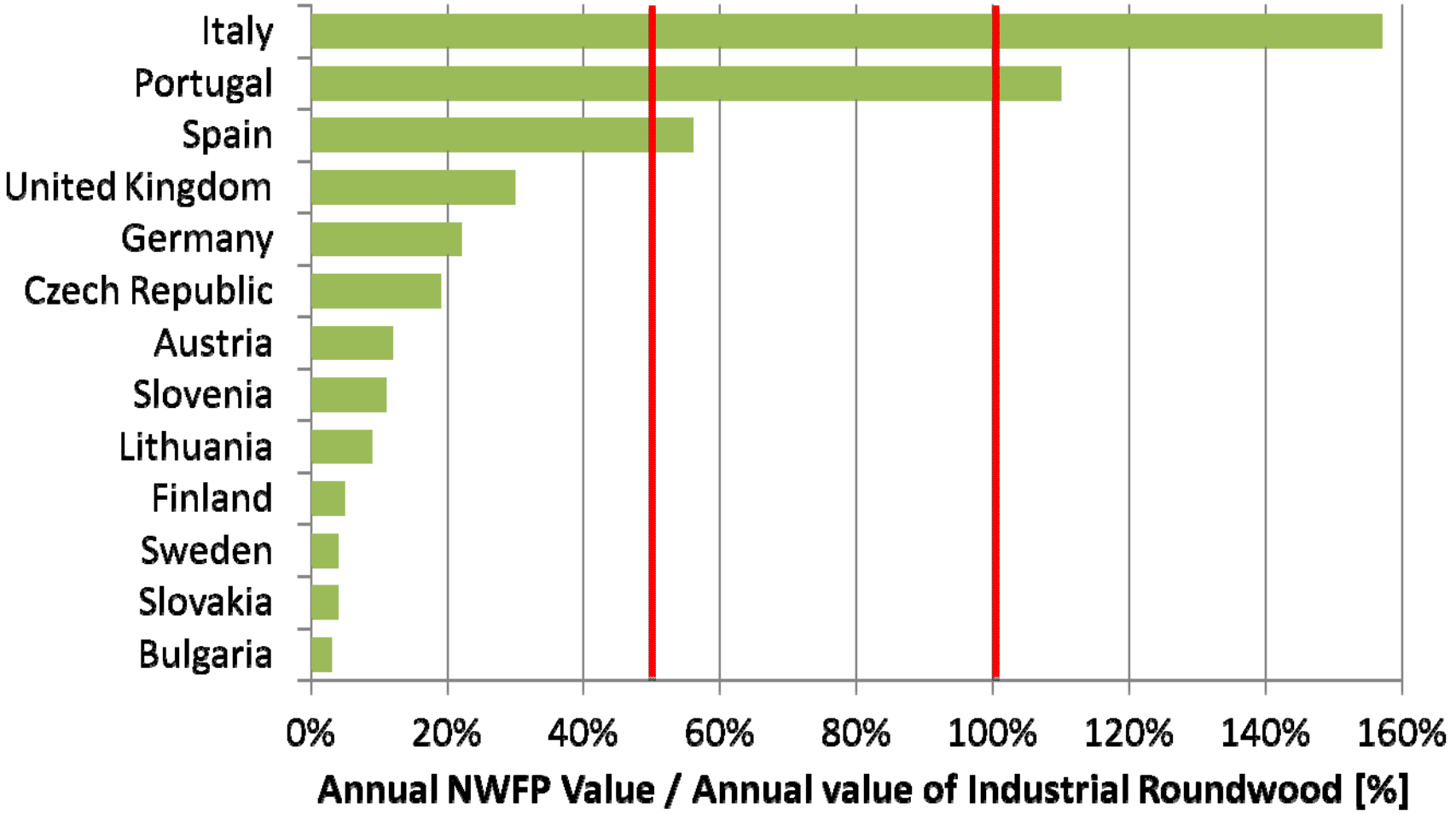
Krakow, 20-21.2.2014

Wild mushroom economy in Italy

Davide Pettenella and Enrico Vidale

Dip.TeSAF – University of Padova

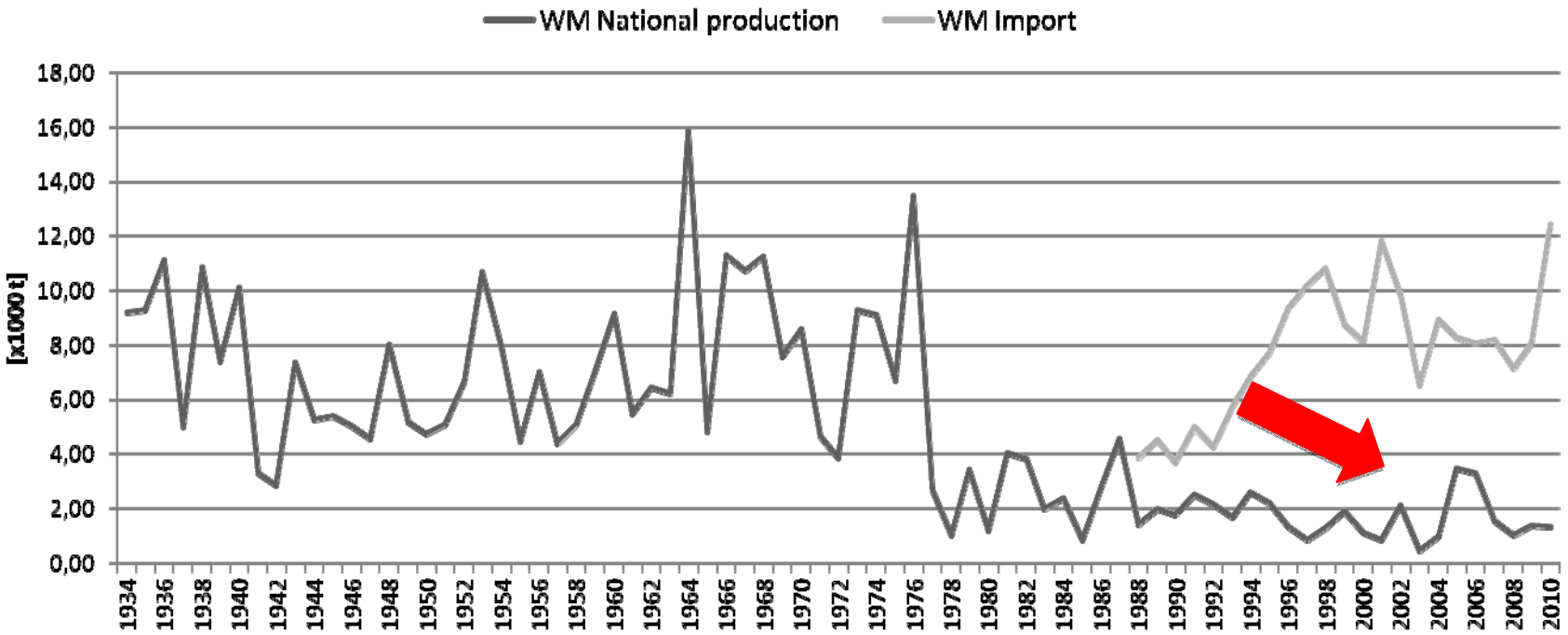
EU NON-Wood Forest Prod: Are forest so poor?



Source: Forest Europe 2011, modif. (year 2007)

Italian wild mushroom market

Let's see the effect of welfare change and demand of **new forest demand**



Source: ISTAT (2012), EuroSTAT (2012) modif.

Italian WM market: Two segments

Wild Mushrooms (WM)

- **Mass market**: ← import

-Local niche markets: mushroom picking as a recreational activity

An example for the mass market
Dalla Valle company

The case study in Finland: WEF as mass product

Why Finland?

Merely due to some key aspects:

- a key entrepreneur funded one of the largest WEF collecting system in EU → WEF price maker
- Logistic: 2 track day from the main market
- Large availability of the product

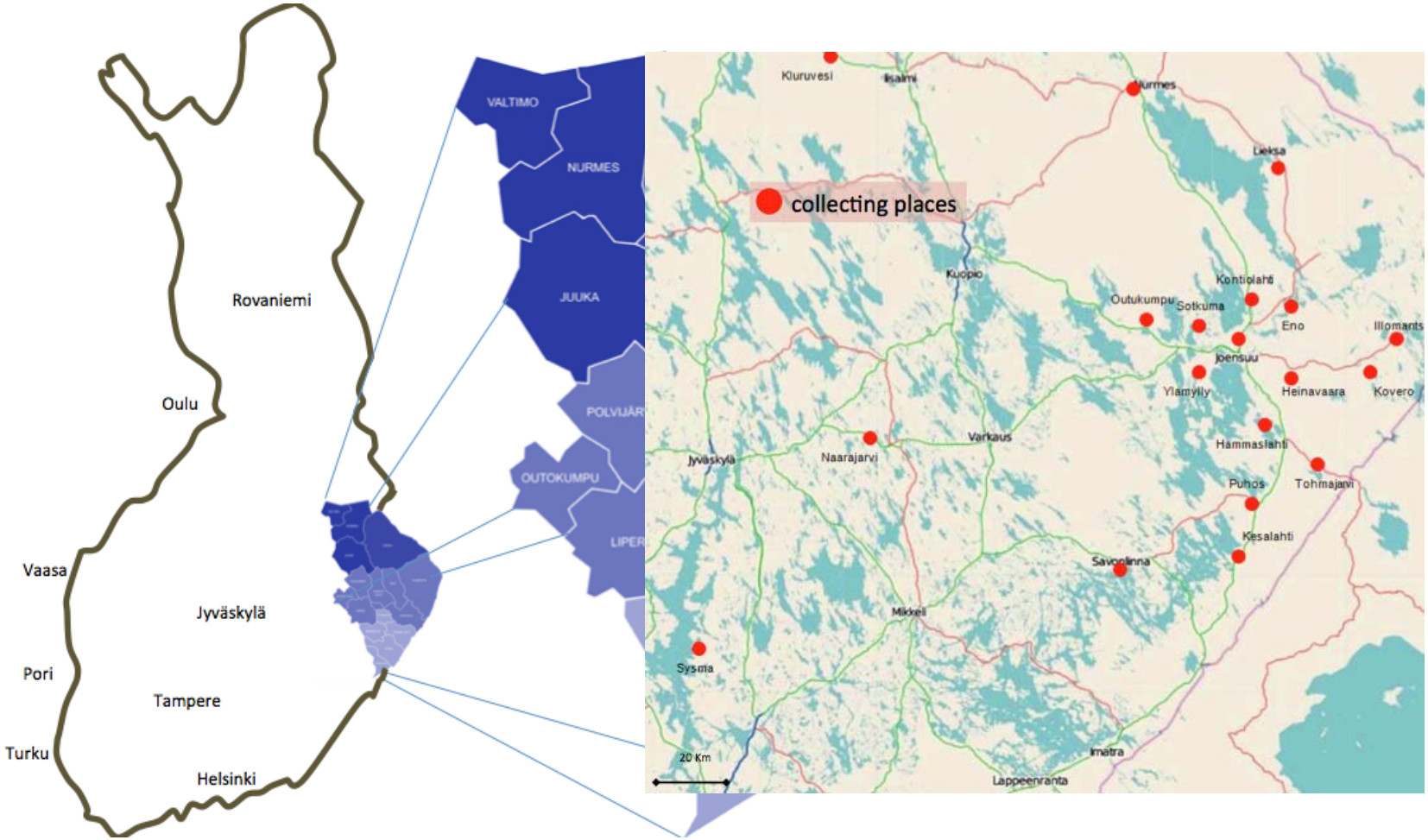
The context

- Wild mushroom → forest externalities (every man's rights –customary law)
- No harvest limits
- Zero fiscal pressure on the WM trade

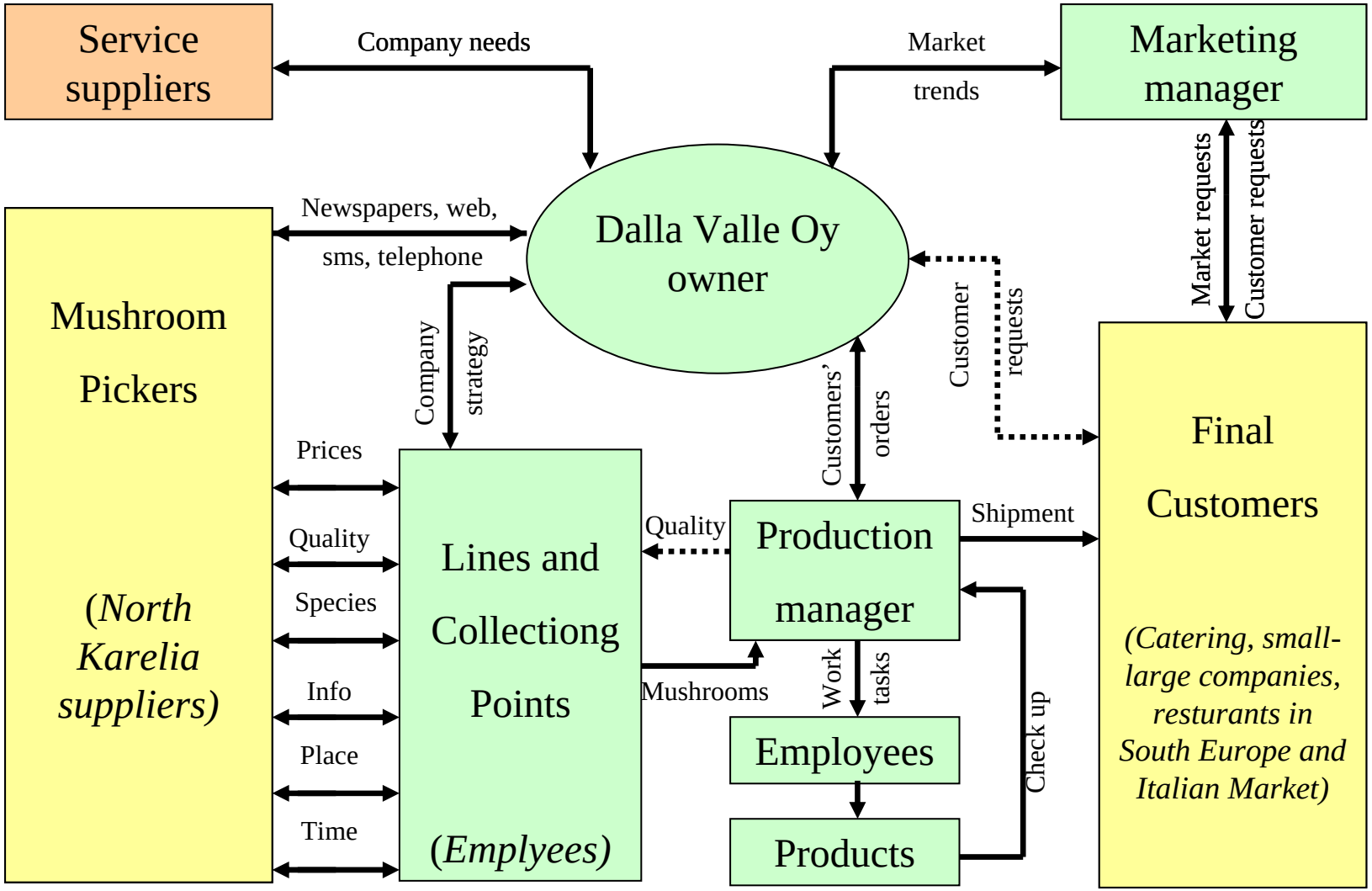
The case study in Finland: Dalla Valle company

- Funded in the 1995
- Export oriented
- In the 1997 fresh and frozen
- In the 2003: 1/3 of the global fresh boletes in the world (1100 tons)
- 20,000 pickers

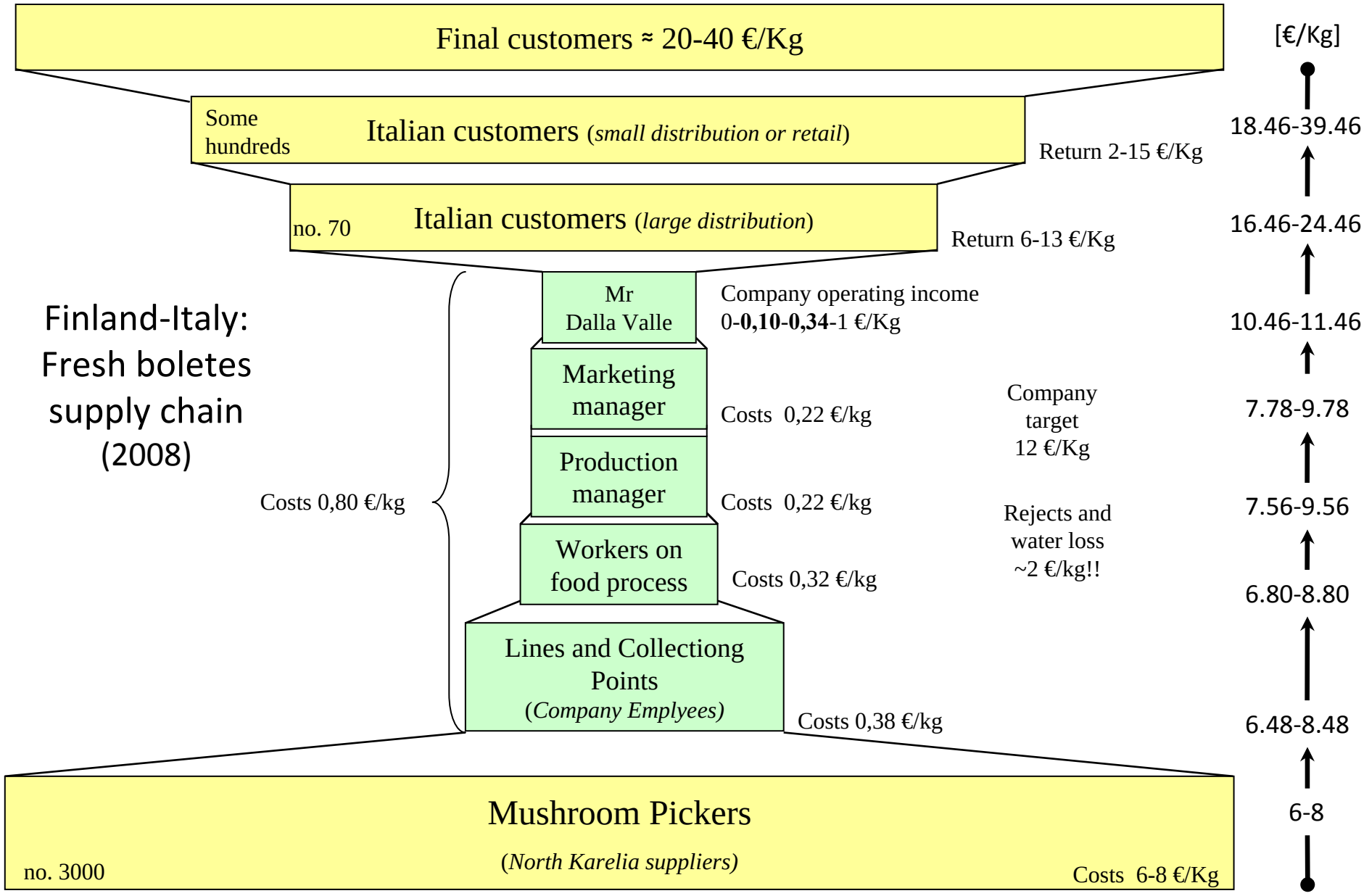
The case study in Finland: Dalla Valle company



The case study in Finland: How it works



Case study in Finland: supply chain



An example for the niche market
The Vicenza (NE Italy) province

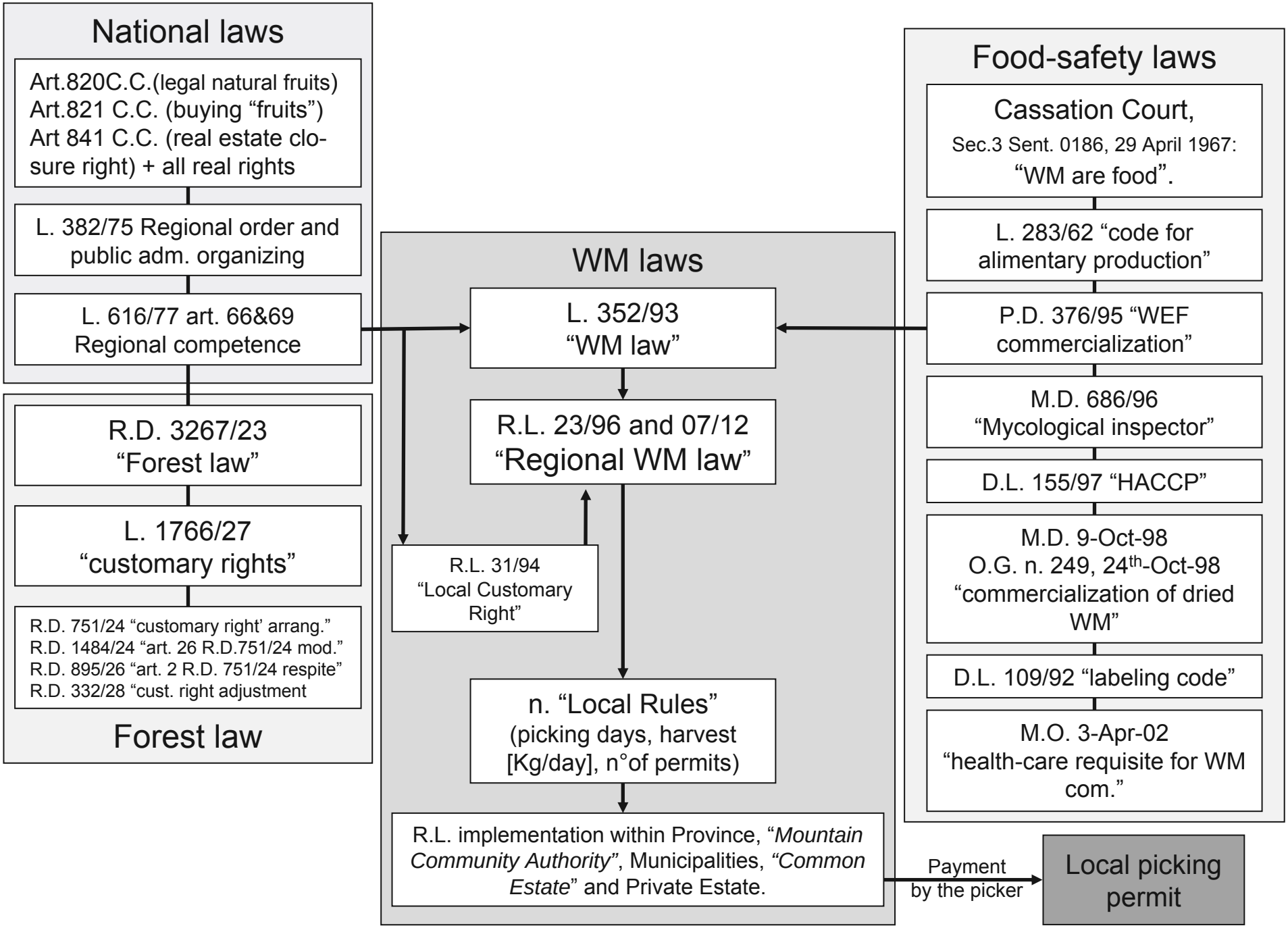
Italian WM market: Two segments

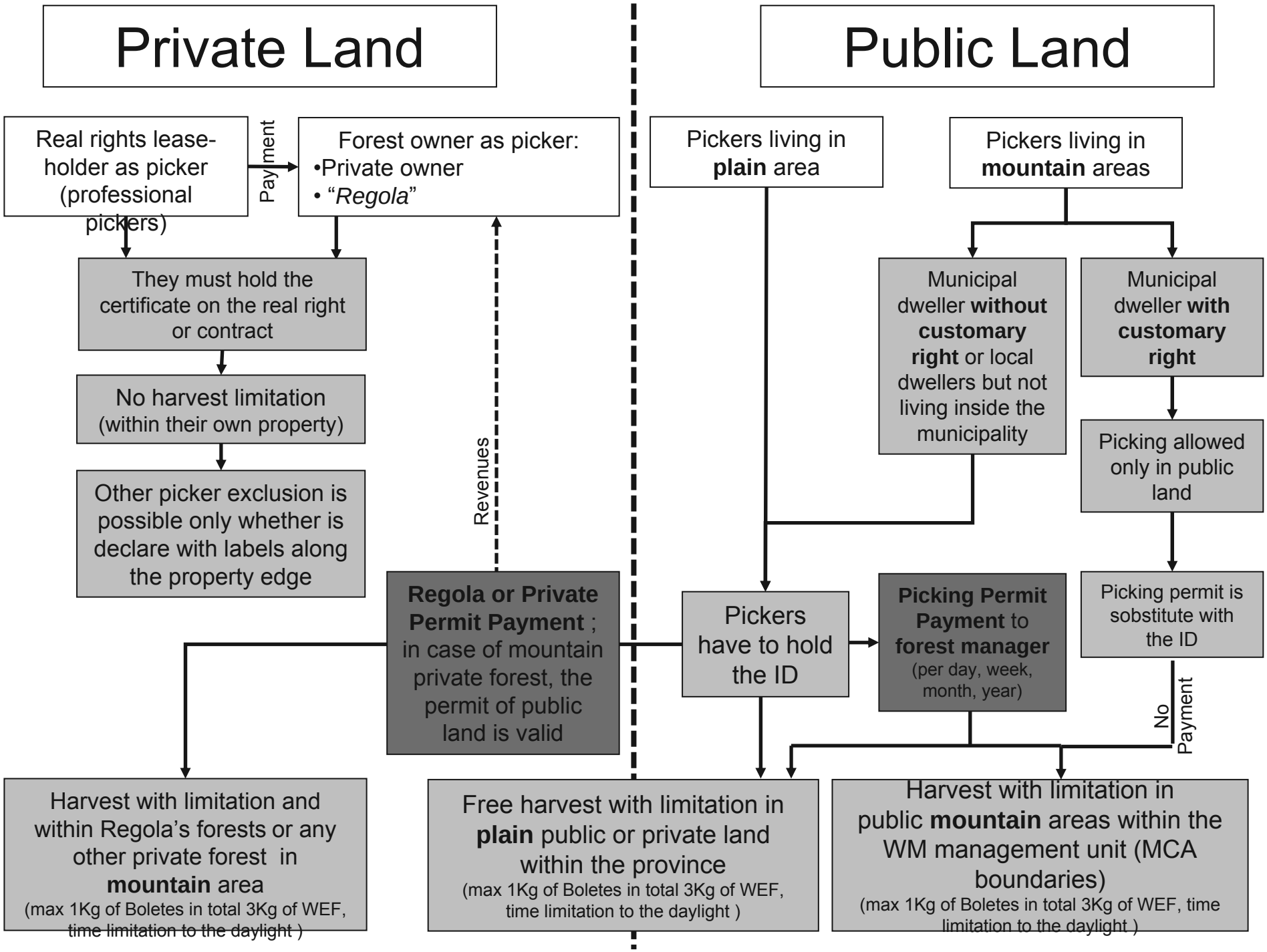
Wild Mushrooms (WM)

- **Mass market**: ← import

- **Local niche markets**: mushroom picking as a recreational activity

… problem of WM picking congestion! Policy maker had to regulate the sector ensure the resources


National laws
Art.820C.C.(legal natural fruits)
Art.821 C.C. (buying "fruits")
Art 841 C.C. (real estate clo-sure right) + all real rights
L. 382/75 Regional order and public adm. organizing
L. 616/77 art. 66&69 Regional competence
R.D. 3267/23 "Forest law"
L. 1766/27 "customary rights"
R.D. 751/24 "customary right' arrang."
R.D. 1484/24 "art. 26 R.D.751/24 mod."
R.D. 895/26 "art. 2 R.D. 751/24 respite"
R.D. 332/28 "cust. right adjustment
Forest law
WM laws
L. 352/93 "WM law"
R.L. 23/96 and 07/12 "Regional WM law"
R.L. 31/94 "Local Customary Right"
n. "Local Rules" (picking days, harvest [Kg/day], n°of permits)
R.L. implementation within Province, "Mountain Community Authority", Municipalities, "Common Estate" and Private Estate.
Food-safety laws
Cassation Court, Sec.3 Sent. 0186, 29 April 1967: "WM are food".
L. 283/62 "code for alimentary production"
P.D. 376/95 "WEF commercialization"
M.D. 686/96 "Mycological inspector"
D.L. 155/97 "HACCP"
M.D. 9-Oct-98 O.G. n. 249, 24th-Oct-98 "commercialization of dried WM"
D.L. 109/92 "labeling code"
M.O. 3-Apr-02 "health-care requisite for WM com."
Payment by the picker
Local picking permit


Private Land
Public Land
Real rights lease-holder as picker (professional pickers)
Payment
Forest owner as picker:
•Private owner
• "*Regola*"
Pickers living in **plain** area
Pickers living in **mountain** areas
They must hold the certificate on the real right or contract
No harvest limitation (within their own property)
Other picker exclusion is possible only whether is declare with labels along the property edge
Revenues
Municipal dweller **without customary right** or local dwellers but not living inside the municipality
Municipal dweller **with customary right**
Picking allowed only in public land
Regola or Private Permit Payment ; in case of mountain private forest, the permit of public land is valid
Pickers have to hold the ID
Picking Permit Payment to **forest manager** (per day, week, month, year)
Picking permit is sobstitute with the ID
No Payment
Harvest with limitation and within Regola's forests or any other private forest in **mountain** area (max 1Kg of Boletes in total 3Kg of WEF, time limitation to the daylight)
Free harvest with limitation in **plain** public or private land within the province (max 1Kg of Boletes in total 3Kg of WEF, time limitation to the daylight)
Harvest with limitation in public **mountain** areas within the WM management unit (MCA boundaries) (max 1Kg of Boletes in total 3Kg of WEF, time limitation to the daylight)

Wild mushroom picking: The case study area

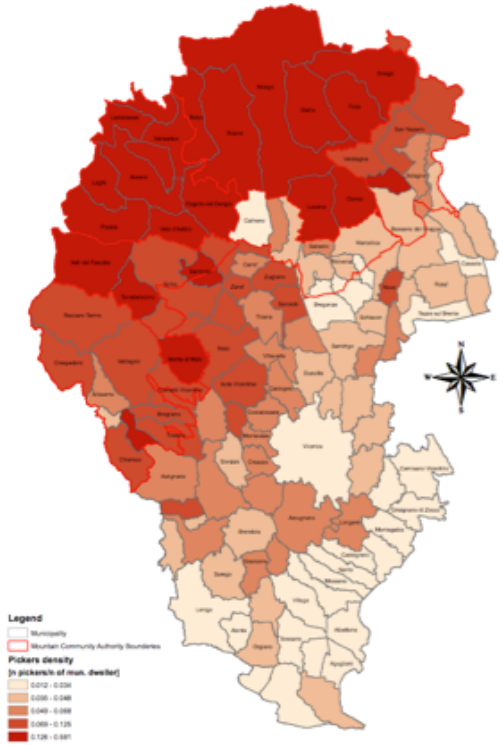
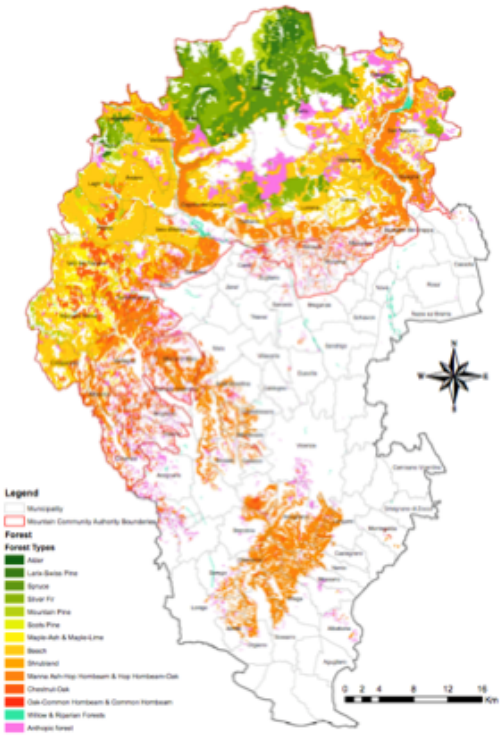
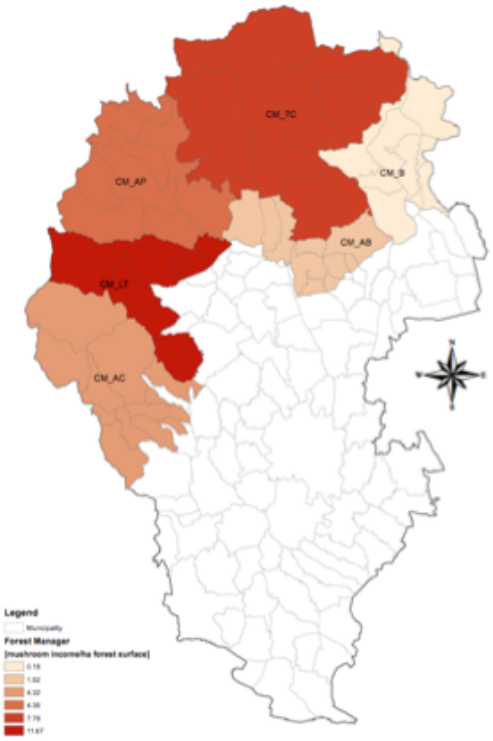
The final “product” is the picking experience!

Forest recreation in Veneto region: some data

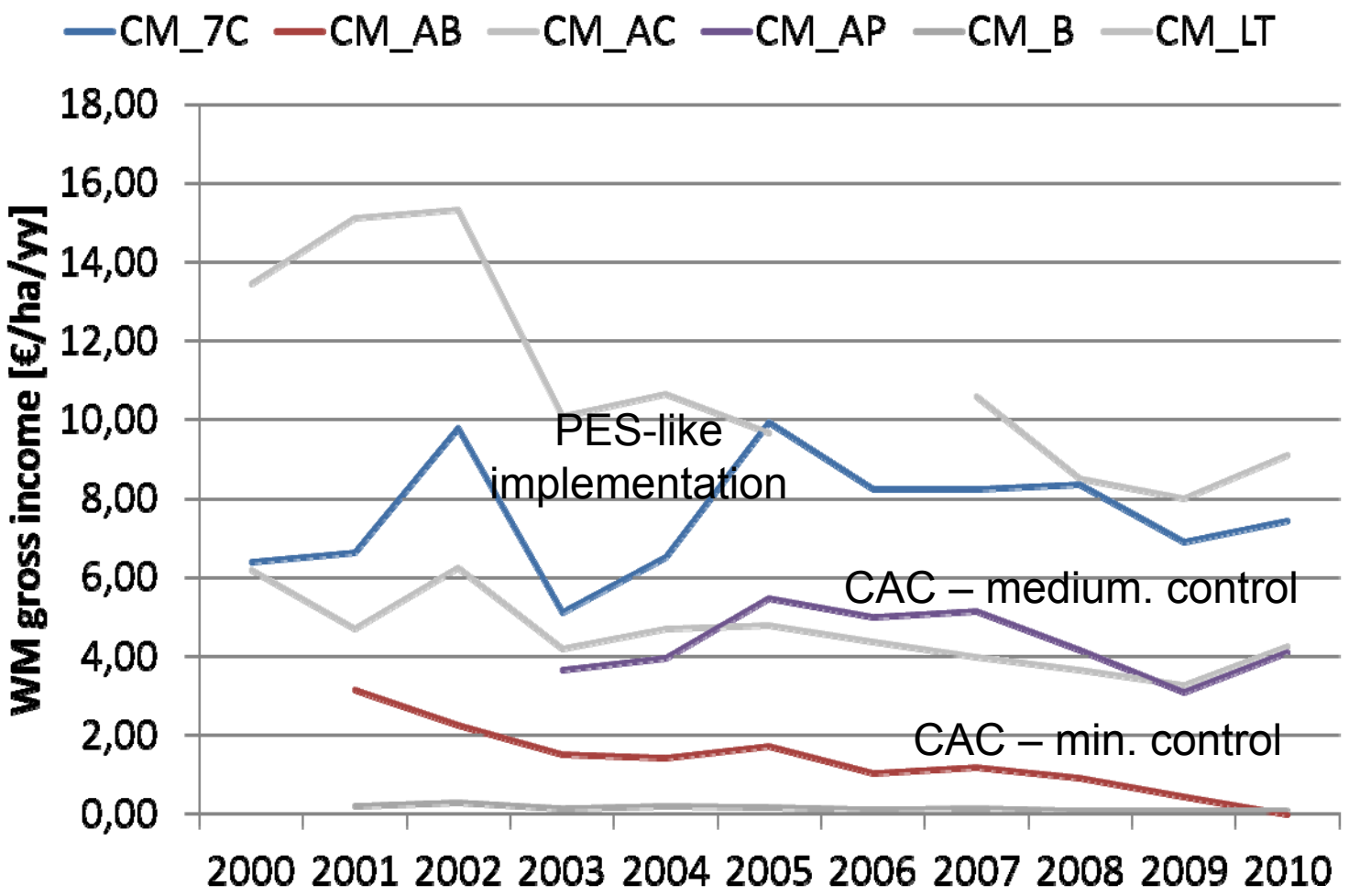
- Annual revenue from WM picking at regional scale **0.2-0.5M€/yy** (high variability linked to the summer rainfall)
- Approximately **80-120.000 recreational** pickers
- **~70.000** recreational pickers in the Provice of Vicenza formally recorded

Payment for WEF: results

The case of recreational mushroom picking in Vicenza Province

Mushroom picker distribution as rate of municipal population	Forest types	Mushroom income per hectare
		
Note: Quantile distribution	Note: the majority of symbiotic mushroom (Boletus spp.) are produce in from green to dark yellow forest areas (coniferous and beech forests), while orange and other colour area generate mainly honey mushroom (Armillaria spp.)	Note: average mushroom income per hectare by forest managers (Mountain Community Authority). High values occur where silviculture practices consider wild mushroom (CM_7C); outliers may occurs if we look at local uses (CM_LT) where pickers collect honey mushroom (Armillaria spp.): a forest parasite.

Forest recreation in Veneto region: three case studies in Vicenza prov.



Payment for WEF: Concluding remarks

- If wild mushroom picking has to become a tool for local development, **property rights regulation** is only the **initial step**
- You need a **system of control**
- To be effective, the system of control has to **involve the local population** (special categories: hotel, B&B, land owners)
- And be part of **a package of services** provided to the tourist (information, drying equipment, car parks, alert systems, accompanying guides, …)