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Edible wild mushroom tourism as a source of income and employment in rural areas. The case of Castilla y León

P. de Frutos Madrazo[1], F. Martinez Peña[2], S. Esteban Laleona[1]

[1] *Departamento de Economía Aplicada. Universidad de Valladolid*
[2] *Departamento de Investigación y Experiencias Forestales. Junta de Castilla y León*

Abstract

Edible wild mushroom picking is becoming an important source of income in rural areas. The wide range of activities which add value to mycological production (initial sale, transformation, marketing, etc.) include those related to tourism which can attract visitors to mushroom producing areas, leading to so-called mycological tourism. To date, no research exists quantifying the importance thereof in rural areas endowed with such resources. The present research provides the first model to estimate this activity's contribution to the economy of rural areas in the region of Castilla y León. The main finding to emerge evidences a close link between influx of visitors, who come principally to pick, and mycological productivity in the region. Based on this relation, we estimate four key variables to determine the impact which said activity has on the regional economy as a whole: the number of overnight stays and trips made by mycological tourists, as well as associated expenditure and employment created. Findings underscore the importance of this activity in the regional tourism industry and point to its significance as a major market niche, particularly during the hotel low season. The need for public administrators to implement a related management policy is also inferred.

Key words: mycological tourism; estimation model; economic contribution to income and employment.

Resumen

El turismo micológico como fuente de ingresos y empleo en el medio rural. El caso de Castilla y León

La recolección de hongos silvestres comestibles se está convirtiendo en un importante motor generador de rentas en el medio rural. Entre las variadas actividades que aportan valor a la cadena de producción, relacionadas con la micología (primera venta, transformación, comercialización, etc.), se encuentran aquellas de turismo capaces de atraer visitantes a los territorios productores o turismo micológico. En la actualidad no existe ninguna investigación que cuantifique su importancia en las áreas rurales con recurso. Así, en la presente investigación se desarrolla por primera vez un modelo, que se aplica para estimar esta aportación a la economía de los territorios rurales de la comunidad autónoma de Castilla y León. El principal hallazgo obtenido muestra que existe una fuerte relación entre afluencia de visitantes, cuya principal motivación es recolectar, y la productividad micológica del territorio. A partir de esta relación se estiman cuatro variables fundamentales para calcular la importancia de esta actividad en el total de esta economía: el número de pernoctaciones y de viajes realizados por turistas micológicos, así como el gasto asociado y el empleo generado. Los resultados expuestos muestran la importancia relativa de esta actividad sobre el sector del turismo rural en la región, lo que la convierte en un importante nicho de mercado de vital importancia, sobre todo en temporadas de baja ocupación de los establecimientos hoteleros, lo que hace necesario políticas de gestión de esta actividad por parte de las administraciones públicas.

Palabras clave: turismo micológico; modelo de estimación; aportación económica a la renta y al empleo.

Introduction

In recent years, rural tourism has emerged as a viable alternative for boosting development in rural areas in Europe, particularly in less favoured regions (Roig, 2005). This has led to abundant research addressing the study thereof from the standpoint of demand (Fuentes, 1995; Roig, 2005, etc.) as well as supply (IET, 1996; Solsona, 2001; Ribeiro and Marqués, 2002; Barke, 2004; etc.).

* Corresponding author: pablof@ea.uva.es
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Several studies have also explored the situation of specific market niches within the sector, such as wine tourism (Vargas *et al.* 2008), bird-watching tourism (Juan, 2006; Fernández *et al.*, 2007 or López, 2008), or conference tourism (Ordinas and Binimelis, 2003; Besteiro, 2003 or Ponce, 2007). Research into mycological tourism remains scarce, however, the only prominent contribution being that of Lázaro (2008), who provides a descriptive analysis of its market structure[1].

Far less progress has been made in research dealing with the contribution to the chain of value and employment in areas where such activities exist. Existing studies include Rico (2005), for rural tourism in the autonomous community of Castilla y León, or López (2008), for bird-watching tourism[2], although no such works exist for mycological tourism.

The present research thus seeks to gauge the impact of this activity on the economy of rural areas within the autonomous community of Castilla y León. To this end, we estimate four key variables: number of overnight stays and trips made by mycological tourists in the region, as well as the associated expenditure and employment this activity generates. In order to ascertain its contribution, these values are compared to those corresponding to rural tourism, the hotel and catering industry, and the regional economy as a whole.

The paper is organised as follows. Section 2 explores the socioeconomic importance of harvesting wild edible mushrooms. We then describe the mycological tourism market from the viewpoint of supply and demand. Section 4 describes the model applied and sources used to gather data, and offers an analysis of the results. The article concludes by describing the main findings and conclusions to emerge, the references and annexed data.

Socioeconomic impact of harvesting edible wild mushrooms

Harvesting of edible wild mushrooms is becoming a key source of income in rural areas. Quantifying its impact in rural economies is an emerging line of research in which most international as well as national studies focus primarily on how such a resource is managed within forest planning programmes (Hosford *et al.*, 1997; Palm and Chapela, 1997; Martínez, 2003; Martínez *et al.*, 2003, etc.).

Most of these works are based on studies of tourist influx to production areas, and describe the profile of harvesters in terms of number, origin and socioeconomic features. Research aimed at quantifying and evaluating use of mycological resources remains, however, in its infancy. At a global scale, there are no reliable statistics or estimations of the number of edible wild mushrooms harvested and marketed, published data being only partial, disperse and heterogeneous (Delmas, 1989; Courvoisier, 2000; Boa, 2004; Pilz and Molina, 2002, and Edouard, 2003).

According to data from the Department of Forest Research and Experiences (Spanish acronym: DIEF-Valonsadero) at the Regional Government of Castilla y León (Martinez *et al.*, 2006), 53.6% of the rural population in the region regularly collect edible wild mushrooms (approximately 516,000 pickers), three-quarters of whom state that they do not usually sell what they pick, but harvest for their own consumption. This would indicate that some 10,000 tonnes per year of over a dozen species of socioeconomic interest are being harvested. In financial terms, the estimated amount that can be harvested in Castilla y León points to the possibility of generating up to 65 million euros a year in direct revenue through the trading of the main commercial species[3]. Taking this figure as a starting point, the chain of added value is extremely important in sectors such as transformation, commercialisation or the restaurant industry, which creates a significant number of permanent as well as temporary jobs that have yet to be quantified (Frutos *et al.*, 2008).

A further emerging line of research deals with the recreation value linked to harvesting edible wild mushrooms. Over the last decade, studies have been published estimating harvester consumer surplus in various areas and therefore, level of satisfaction associated to collecting. Authors apply a range of different techniques to evaluate intangible goods, particularly those based on observed preferences, such as the cost-travel

[1] Less relevant contributions include: Martinez *et al.* (2003) who provides a brief description of demand, or Moreno-Arroyo *et al.* (2007) who address the issue of supply in Andalusia.

[2] This author provides data concerning the importance of this activity at a global scale in terms of employment and economic impact.

[3] Other less conservative estimates put the figure at anything up to 107 million euros per year which, if extrapolated to the whole country, could mean 600 million euros in direct revenue for pickers from the sale of mycological products.

method, as well as others based on stated preferences, such as the contingent valuation method or choice models.

In the first case, for instance, Starbuck *et al.* (2004), calculate daily consumer surplus at 30$ for gathering fruit and edible wild mushrooms in the Gifford Pinchot National Forest in the state of Washington (USA). Martínez de Aragón (2005) estimates this value to be 38€ per visitor collecting in the area of Solsones in Catalonia, and Frutos *et al.* (2009) estimate a value of 10€ per collector in the area of Pinar Grande (Soria). In the second case, Mogas and Riera (2003), applying a choice experiment, estimate willingness to pay to gather wild mushrooms in future forested areas in Catalonia to be 5.77€ per year, whilst Martínez de Aragón (2005) and Frutos (2010), using contingent valuation, estimate this willingness to be 8€ for a daily licence to collect in the above-mentioned forested areas, and 10€ for a season in the forested areas in the province of Soria, respectively.

Mycological tourism

The development of mycological tourism over the last few years is framed within what Velázquez (2007) refers to as *new trends in rural tourism*, which involves specialising in creating a "unique product" based on a particular theme such as business tourism, training tourism, health tourism, etc. This is leading to excellent growth prospects in certain market niches which in recent years have witnessed the emergence of concepts like mycological tourism or wine tourism, and even others that are far more specific such as bird-watching tourism or theatre production tourism.

From the supply standpoint, these models do not focus exclusively on the existing accommodation infrastructure. Mycological tourism, for instance, encompasses a wide variety of products able to encourage visitors not only to come and stay but also to engage in a whole range of activities related to collecting wild mushrooms. Lázaro (2008) states that such initiatives may fall into the category of not just price-related tourist products, which would include guided wild mushroom tours, basic and combined mycological packages, culinary workshops and sale of wild mushroom products, but also non-price-related mycological products, such as wild mushroom workshops, self-guided tours and specialisation centres[4].

As regards price-related tourist products, guided edible wild mushroom trails may be described as a service usually offered to relatively inexperienced amateur pickers, aimed at showing them how to distinguish the main edible species which are of socioeconomic interest. These trails tend to be four or five hours long and are usually comprise: 1) visitor welcome, 2) informative explanation, 3) picking wild mushrooms, and 4) identifying species collected. Mycological "package deals" are tourist products which have a wide-ranging impact in the area due to the number of stakeholders involved and the possibility of prolonging the stay in the area. In purely mycology related tourism, only activities linked to mycology (mycological guides, tasting and sale of products, sale of dissemination material, etc.) are offered, and might include accommodation, usually for the weekend. In mixed packages, mycological activities are offered together with other outdoor leisure and nature-related pursuits such as sports activities (cycling tourism, hill-walking, etc.), cultural visits, etc. Cuisine is perhaps the main element available in rural tourism. Such is the range of possibilities that it is impossible to provide a single definition that would embrace all the potential aspects of mycological tourism. For instance, as well as purely gastronomic events, hundreds of restaurants offer dishes that include wild mushrooms, thereby providing an added attraction for visitors. Further related activities such as mycological snack contests or others not directly connected to the hotel and catering industry, such as mycological cuisine contests, food tasting events, demonstrations of *haute* cuisine using mushrooms and so on should also be considered. Finally, as regards the sale of mycological products, these are becoming increasingly sophisticated and more and more prominent in specialised delicatessen food stores.

With regard to non-price tourist products, mycological seminars originally emerged as a means of disseminating the activities undertaken by mushroom associa-

[4] One example of the boom in this kind of infrastructure can be found in Castilla y León, where there are six mycological centres, some 100 mycological trails and over 100 establishments that have been awarded a quality certificate through the GASTROMYAS programme, in addition to a wide range of activities related to mycological training and guides. Another fact bearing out the importance of the industry is that over half the restaurant facilities located in areas which have mycological resources offer dishes that include edible wild mushrooms. For further information see http://www.myas.info/micoturismo. For Andalusia, information on the current state of this infrastructure may be found in Moreno-Arroyo *et al.* (2007).

tions and are currently the most popular mycological tourism activity. They vary greatly in terms of format and content, ranging from exhibitions, lectures, outings to pick mushrooms, and specialised markets to cooking and photography contests, etc. As regards self-guided trails, these are signposted in situ and/or using maps, allowing mycological tourists to follow them on their own without the need for a guide. All the information concerning the route, habitats, species, areas of natural beauty, etc. may be easily interpreted by the visitor. Finally, specialised centres go under a wide range of names: mycological centres, mycological interpretation centres, mycological museums, mycological information points, etc. These are infrastructures equipped with all that is required to engage in a wide range of mushroom related activities, particularly visitor training and information. In an effort to attract them to the area, visitors are also normally offered courses, exhibitions, workshops, conferences, and so on. In many instances, these also serve as information points for mushroom collectors, where different species may be identified.

Whatever the case, two aspects remain key to attracting mycological tourists. Firstly, the actual infrastructure in terms of accommodation and restaurants in the area, which it shares with other tourist activities, and secondly productivity in the forest areas where the activity exists. As will be seen later on, mycological tourism cannot be conceived without highly productive forests, which provide the main attraction for tourists.

From the standpoint of demand, the main problem is defining what is understood by the term mycological tourist. Given the range of services available, a broad definition may be made of this group, such that a mycological tourist might be considered as someone who consumes one of the products or services defined above. Yet, such a definition entails two problems. Firstly, this does not have to include in the target group those whose main purpose in coming is to collect, who stay overnight in the area, but who do not consume the available mycological goods and services, which would mean overlooking an important number of people when quantifying demand. Secondly, others who may be classed as mycological tourists are those using some restaurant services, such as enjoying a dish of edible wild mushrooms or visiting a specialised centre, but who have not travelled to the area to pick mushrooms or who may even have undertaken the journey for a completely different reason.

As a result, for the research at hand, a mycological tourist is defined as someone who travels to the specific area of the case study, both from within[5] as well as from outside the area, who stays in the area overnight and whose main purpose for travelling is to collect edible wild mushrooms, irrespective of whether or not they consume mycological goods and services. This also means excluding so-called "day-trippers" or recreational pickers who harvest for their own consumption and whose main goal is to pick, regardless of whether or not they consume mycological goods and services, but who do not stay in the area overnight. Despite the importance of mushroom pickers who do not stay overnight, methodologically it is not possible to take account of them when estimating their contribution as tourists to the regional economy, since the World Tourism Organization (WTO, 1994) defines tourists as visitors who spend at least one night at a collective or private accommodation establishment in the country/place visited. This definition has subsequently been accepted by most countries, who include as tourists in their statistics visitor who fulfil this requirement (EUROSTAT, National Statistics Office, etc.)

In this vein, Martínez *et al.* (2003) find that 54% of pickers from outside the region returned to their place of residence the same day, with only 7% booking accommodation[6]. Moreover, of all the collectors surveyed, only 54% stated that the main reason for making the journey was to pick edible wild mushrooms. These data reflect how difficult it is to provide an accurate definition of demand, many descriptions and categories being available depending on the criteria chosen.

Model and data

Setting out the model

The model presented was designed specifically to estimate mycological tourism's contribution to the regional economy of Castilla y León. Since a review of the scientific literature failed to provide us with a model which might be used for our purpose, we were

[5] What the World Tourism Organization refers to as internal or domestic tourism has also been taken into account, in other words visitors who travel within their own region or country. In this instance, these are pickers who live in Castilla y León, who travel to pick within the region, and who stay overnight in the area to which they have travelled.

[6] Study conducted in the area of the central flat pine forests in the province of Soria.

forced to develop one ad-hoc for the case in hand. This model was divided into four different parts. Firstly, the number of overnight stays by mycological tourists is calculated, together with the total number of mycological tourists, in the main edible wild mushroom producing areas in the region. Secondly, these variables are estimated for the remaining rural areas of the autonomous community, irrespective of the importance of mycological resources. Thirdly, the expenditure linked to these overnight stays or tourists in the rural area under study is estimated. Finally, the number of equivalent full-time jobs generated by the activity in the autonomous community is estimated.

The sample unit used was a local action group (LAG) within the region of Castilla y León, which covers all municipal areas of less than 10,000 inhabitants, such that the estimated data may be considered to correspond to all rural areas in Castilla y León[7].

Calculating the number of overnight stays and mycological tourists in the main LAG producers

Following the proposed definition, the number of overnight stays (NP_i) by mycological tourists in each of the local action group areas sampled in the year under study is calculated as follows:

$$NP_i = NSC*NA_i*NMP_i*(2*POOFD_i*POOFDTM_i + 5*POORS_i*POORSTM_i) \quad [1]$$

where:

— NSC: average number of weeks the edible wild mushroom season lasts.

— NA_i: number of places available in rural accommodation in each LAG area.

— NMP_i: mean number of places in rural accommodation in each LAG area.

— $POOFD_i$: mean percentage occupation rate on autumn weekends at rural accommodation establishments in each LAG area.

— $POOFDTM_i$: mean percentage occupation rate by mycological tourists on autumn weekends at rural accommodation establishments in each LAG area.

— $POORS_i$: mean percentage occupation rate at rural accommodation establishments in each LAG area during the rest of the week in autumn.

— $POORSTM_i$: mean percentage occupation rate by mycological tourists in autumn at rural accommodation establishments in each LAG area during the rest of the week in autumn.

Based on the number of overnight stays, the number of mycological tourists in each local action group area sampled (NTM_i), assimilated to the number of trips to the study area complying with the characteristics described, is calculated as follows:

$$NTM(EM)_i = NP_i/DETMM \quad [2]$$

$$NTM(EC)_i = NP_i/DETMC \quad [3]$$

where DETMM is the mean length of the stay by a mycological tourist. Given the lack of available data for this variable for the case of mycology, a further additional value is taken into account, based on the mean length of the stay of 1 to 3 days (DETMC). The two values have been chosen from the mean length of stays in rural tourism in Castilla y León (see data source).

Estimating the number of overnight stays and mycological tourists in rural areas in Castilla y León

Although the arrival of mycological tourists to production areas may be dependent upon a number of factors (distance, accessibility, etc.), the most likely hypothesis is that the number of overnight stays/mycological tourists basically depends on the expected harvest, where a positive relation between the two variables should exist. As a result, the explanatory variable would be the value of edible wild mushroom production in the woodlands and forests in each local action group area, such that we might calculate the corresponding function of overnight stays for all groups as follows[8]:

$$NP_i = \alpha + \beta*PBE_i + \varepsilon_i \quad [4]$$

where:

— PBE_i: gross production value of socio-economically important edible wild mushrooms (except truffles) in each LAG area.

— α and β: parameters to be fitted in the regression procedure.

— ε_i: error regression term.

[7] In Castilla y León, there are 44 local action groups working in 2,204 municipal areas and 5,898 populated areas, covering 91,951 km^2, of which around 60,000 are classified as forested land and have some degree of mycological production, according to the national forest inventory.

[8] The models are shown in a linear format as this specification provided the best fit.

A further important variable might be search time. In other words, a woodland or forest might be rich in terms of edible wild mushrooms, yet might extend over a large area. In such cases, the time needed to collect the same amount would increase as the size of the forest area in question also increases, which might discourage pickers in general and mycological tourists in particular from coming. In an effort to include this hypothesis, a second model based on forest or woodland productivity was posited, such that the following overnight stay function is also estimated:

$$NP'_i = \alpha' + \beta'*PRODUCTE_i + \varepsilon'_i \quad [5]$$

where:

— $PRODUCTE_i$: value of mean productivity of socio-economically important edible wild mushrooms (except truffles) in each LAG area, calculated as the PBE divided amongst all forested areas in each group.

— α' and β': parameters to be fitted in the regression procedure.

— ε'_i: error regression term.

The two models are adjusted through ordinary least squares, where the dependent variable used (NP_i) is calculated based on the procedure described in the previous section. Based on the value of the parameters obtained, the number of overnight stays in all the local action group areas in Castilla y León is fitted. This gives rise to two different estimations, one based on production, NP(PBE) and another based on productivity, NP(PRODUCTE). As with the groups surveyed, using previous data, the number of mycological tourists is fitted, based on the two assumed cases of length of stay, for all the LAGs in the autonomous community, using both models (gross production value and productivity): NTM(EM/PBE), NTM(EM/PRODUCTE), NTM(EC/PBE) and NTM(EC/PRODUCTE)[9].

Estimating expenditure associated to overnight stays/ mycological tourists in rural areas in Castilla y León

Taking the above described variables as a basis, we calculate for each of the local action group areas the total expenditure generated by tourism related to activities for which the main reason to travel was to pick edible wild mushrooms. Merging the assumed cases yields eight expenditure variables: four based on the number of overnight stays, which we refer to as GNP(EM/PBE), GNP(EM/PRODUCTE), GNP(EC/PBE) and GNP(EC/PRODUCTE) respectively, and a further four based on the number of mycological tourists, which we refer to as GNTM(EM/PBE), GNTM(EM/PRODUCTE), GNTM(EC/PBE) and GNTM(EC/PRODUCTE) respectively.

Each is calculated using the following formula:

$$GNP(EM/PBE)_i = NP(PBE)_i*GVDTM*FC \quad [6]$$

$$GNP(EM/PRODUCTE)_i = NP(PRODUCTE_i*GVDTM*FC \quad [7]$$

$$GNP(EC/PBE)_i = NP(PBE)_i*GVDTC*FC \quad [8]$$

$$GNP(EC/PRODUCTE)_i = NP(PRODUCTE_i*GVDTC*FC \quad [9]$$

$$GNTM(EM/PBE)_i = NTM_i\ (EM/PBE)*GVTM*FC \quad [10]$$

$$GNTM(EM/PRODUCTE)_i = NTM_i\ (EM/PRODUCTE)*GVTM*FC \quad [11]$$

$$GNTM(EC/PBE)_i = NTM_i(EC/PBE)*GVTC*FC \quad [12]$$

$$GNTM(EC/PRODUCTE)_i = NTM_i(EC/PRODUCTE)*GVTC*FC \quad [13]$$

where:

— GVDTM: mean expenditure per trip and day of a tourist staying at rural accommodation in Castilla y León.

— GVDTC: mean expenditure per trip and day of a tourist staying at a rural house in Castilla y León for a short period (1 to 3 days).

— GVTM: mean expenditure per trip of a tourist staying at a rural house in Castilla y León.

— GVTC: mean expenditure per trip of a tourist staying at a rural house in Castilla y León for a short period (1 to 3 days).

— FC: correction factor for expenditure variables. Taking the results of the survey conducted amongst rural accommodation establishments, a mycological tourist spends approximately 10% less than other types of tourists in rural accommodation. The correction factor thus used was 0.91.

Estimating the number of equivalent full-time jobs associated to overnight stays/mycological tourists in rural areas in Castilla y León

Finally, to calculate employment generated by mycological tourism Castilla y León, we multiply expenditure associated to the activity in each of the

[9] Models marked as EM refer to the assumed mean duration of the stay, and those marked as EC to a short stay.

models by the number of jobs created in the hotel sector in Castilla y León by each euro of expenditure. To calculate the coefficient in each sector (CNAE-93 55), final household consumption in hotels and catering at basic prices in Castilla y León (GCFHHpb) is divided by the number of equivalent full-time jobs in the hotel and catering sector (total number of employees) (PTEHtc). For 2005, this coefficient is 0.0000100371[10].

This yields eight estimation models for employment linked to each of the eight previous expenditure models, which we refer to as EMPNP(EM/PBE), EMPNP(EM/PRODUCTE), EMPNP(EC/PBE), EMPNP(EC/PRODUCTE), EMPNTM(EM/PBE), EMPNTM(EM/PRODUCTE), EMPNTM(EC/PBE) and EMPNTM(EC/PRODUCTE) respectively.

Data source

The information for calculating the number of overnight stays in local action group areas best suited to benefit from mycological resources is taken from a survey carried out in 2005 in rural municipal areas (of fewer than 10,000 inhabitants) belonging to 11 local action group areas involved in the "Mycology and Quality" inter-territorial cooperation project funded by these LEADER + and PRODERCAL groups and by the Regional Environment Ministry at the Regional Government of Castilla y León.

A total of 499 telephone surveys were conducted amongst rural accommodation establishments, of which 466 took part and 403 were considered valid. Since the total number of establishments is 930, the percentage surveyed came to 43.3%. The survey comprised ten questions relating to the number of places, occupation rates, type of client and expenditure, as well as management attitude towards activities related to edible wild mushroom collecting.

As regards client profile, establishment managers were asked what percentage of rooms were normally occupied during the harvesting season by people whose main reason for travelling was to pick mushrooms in the area, both at weekends as well as during the rest of the week. Since these were small establishments, with an average of eight rooms, the managers (owners in virtually all the cases) tend to be sure why their guests are staying. There is often a close relationship between guest and owner, such that the latter is usually able to distinguish between those who are there for rural tourism and those who are engaging in other activities like fishing, hunting or mushroom picking[11]. This was made very clear during the survey, and during the questioning hardly any managers stated that they did not know or simply did not answer, indicating there was no ambiguity amongst interviewees. Moreover, almost all of the managers evidenced that they knew their clients well when it came to answering other questions related to their guests' socioeconomic profiles.

Data for estimating the number of overnight stays at rural accommodation in Castilla y León are taken from the MICODATA system (Geographic Information System on production, use and planning of mycological resources in Castilla y León), provided by DIEF-Valonsadero. Data for calculating the number of mycological tourists, based on overnight stays, are taken from the institute of tourist studies, specifically statistics on Spanish tourist flows (FAMILITUR, 2005) corresponding to 2005. Data used to calculate expenditure and employment generated as a result of the activity are taken from the input-output framework for the autonomous community of Castilla y León for 2005 (latest available) and (FAMILITUR, 2005). Finally, data on the total number of rural accommodation establishments in each LAG are taken from the survey into tourist infrastructure in Castilla y León at the Regional Ministry of Culture and Tourism at the Regional Government of Castilla y León (2005), and the mean stay during the mushroom season was obtained based on expert opinion.

A more thorough analysis of these sources, variable by variable, is found in Table 1, which provides the name of the variable, its description, its source, any related remarks, the value or mean value, and in the latter case, the standard deviation.

[10] It should be borne in mind that not all mycological tourist expenditure in the region is incurred in this sector. As no information related thereto is available, the same coefficient is used as for the total amount of expenditure. The logical hypothesis is that most expenses, except petrol, are incurred in this sector. Moreover, part of the expenditure may be incurred in other regions during the journey to or from the area where the edible wild mushrooms are picked (buying petrol, food, etc.). Once again, given the lack of information, it is assumed that all expenditure is incurred in the autonomous community.

[11] In the latter cases, it is relatively easy to identify types of guest as they usually take specific equipment such as fishing tackle, shotguns or hunting rifles, or baskets in the case of mushroom pickers.

Table 1. Statistical Sources Used

Name	Description of variable	Source	Comments	Mean	S.D.
NSC	Mean duration in weeks of the mushroom season.	Expert opinion		12.80	–
NA	Number of rural accommodation establishments in each LAG area.	Tourist infrastructure in Castilla y León. Regional Ministry of Culture and Tourism. The Regional Government of Castilla y León[1].		84.55	60.154
NMP	Mean number of places in rural accommodation establishments in each LAG area.	Survey conducted amongst rural accommodation establishments.		25.14	15.988
POOFD	Percentage of mean occupation on autumn weekends in rural accommodation establishments in each LAG area.			0.62	0.1657
POOFDR	Percentage of mean occupation by mycological tourists on autumn weekends in rural accommodation establishments in each LAG area.			0.08	0.112
POORS	Percentage of mean occupation in autumn during the rest of the week at rural accommodation establishments in each LAG area.			0.22	0.154
POORSR	Percentage of mean occupation by mycological tourists in autumn during the rest of the week in rural accommodation establishments in each LAG area.			0.03	0.034
DETMM	Length of average stay by mycological tourists.	Institute of Tourist Studies. Tourist Flows of Spaniards (FAMILITUR 2005)[2].	Assumed to be the same as for tourists staying at rural accommodation establishments in Castilla y León.	4.14	–
DETMC	Length of average stay of mycological tourists (stays between 1 and 3 days).		Assumed to be the same as for tourists staying at rural accommodation establishments in Spain, corrected by the length of the mean stay in the region compared to the rest of the country (correction factor = 1.0753).	2.16	–
PBE	Mean gross production of edible wild mushrooms (except truffles) in each LAG area (thousand €).	MICODATA. Geographical information system on production, use and planning of mycological resources in Castilla y León. Department of Research and Forest Experiences at the Regional Government of Castilla y León (Martinez *et al.*, 2006)[3].		1,983.32	1,940.01
Producte	Mean productivity of edible wild mushrooms (except truffles) in each LAG area (thousand €).			0.01	0.0115

Table 1 (cont.). Statistical Sources Used

Name	Description of variable	Source	Comments	Mean	S.D.
GVDTM	Mean expenditure per trip and day of a tourist staying at rural accommodation in Castilla y León.	Institute of Tourist Studies. Tourist Flows of Spaniards (FAMILITUR 2005).	Assumed to be the same as for tourists staying in Castilla y León at any type of accommodation, corrected by the national value for rural accommodation establishments (correction factor = 0.7134).	46.03	–
GVDTC	Mean expenditure per trip and day of a tourist staying at rural accommodation in Castilla y León for short stays (1 to 3 days).		Assumed to be the same as for tourists staying in Castilla y León at any type of accommodation, corrected by the national value for rural accommodation establishments (correction factor = 0.7695).	44.26	–
GVTM	Mean expenditure per trip of a tourist staying at rural accommodation in Castilla y León.		Assumed to be the same as for tourists staying in Castilla y León at any type of accommodation, corrected by the national value for rural accommodation establishments (correction factor = 0.7134).	127.50	–
GVTC	Mean expenditure per trip of a tourist staying at rural accommodation in Castilla y León for a short period (1 to 3 days).		Assumed to be the same as for tourists staying in Castilla y León at any type of accommodation, corrected by the national value for rural accommodation establishments (correction factor = 0.7695).	91.17	–
GCFHHpb	Expenditure in final consumption of households in hotel and catering at basic prices in Castilla y León (thousand €)	Castilla y León Input-Output model (2005) (4)		5,037.41	–
PREHtc	Equivalent full-time jobs in the hotel and catering industry.			50,561.00	–
FC	Correction factor of expenditure variables.	Survey conducted amongst rural accommodation establishments		0.91	–

Available online: [1] http://www.jcyl.es/sie/ [2] http://www.iet.tourspain.es/paginas/Publicaciones/PubliInfo [3] http://admin.micodata.es [4] http://www.jcyl.es/web/jcyl/Estadistica/s/Plantilla100/1230026518075/_/_/_. Source: own.

Results

Calculating the number of overnight stays and mycological tourists in the main LAG production areas

Table 2 shows the number of overnight stays and tourists generated by mycological tourism in the local action group areas surveyed, calculated based on the proposed formulas. The province to which they belong is also shown, as is the percentage of forested area in each, the number of rural accommodation establishments on the date the survey was carried out, and the percentage of those who stated that there were mushroom pickers amongst their clients.

The mean number of overnight stays per group is 4,340, with between one and two thousand mycological tourists travelling to the areas surveyed every year.

The group with the highest number of pickers who stayed overnight is ASOPIVA, located in the north-west and south-east, respectively of the provinces of Soria and Burgos, with over 23,000 overnight stays and between five and ten thousand mycological tourists each year. Second and third were ASOCIO, in the province

Table 2. Number of overnight stays and mycological tourists in the lag areas surveyed (2005)

Local action group	Province	% forested area	Rural accommodation	% clients who are pickers	NP	NTM (EM)	NTM (EC)
ADATA	Zamora	91.3	37	3.1	11	3	5
ADEMA	Soria	84.1	50	60.0	4,599	1,110	2,130
ADEZOS	Salamanca	91.1	36	11.5	25	6	11
ADISAC	Zamora	77.2	79	2.3	44	11	21
ASIDER	Ávila	71.7	230	22.4	3,071	741	1,422
ASOCIO	Ávila	72.5	152	18.2	6,405	1,546	2,966
ASOPIVA	Burgos/Soria	85.6	114	81.8	23,452	5,659	10,861
CODINSE	Segovia	80.7	78	32.0	909	219	421
PROYNERSO	Soria	72.9	43	46.7	6,167	1,488	2,856
TELENO	León	77.8	68	33.3	1,935	467	896
TIERRAS S. DEL CID	Soria	83.8	43	38.5	1,123	271	520
MEAN		**80.8**	**85**	**31.5**	**4,340**	**1,047**	**2,010**

Source: own.

of Ávila, and PROYNERSO in the province of Soria, with over 6,000 overnight stays and between 1,500 and 3,000 pickers each per season. The groups recording the lowest incidence in this kind of activity are ADISAC and ADATA in Zamora and ADEZOS in Salamanca, all of which registered fewer than 50 overnight stays.

Calculating the number of overnight stays and mycological tourists in rural areas in Castilla y León

A summary of the models estimated to generalise behaviour of mycological tourists to all areas in the autonomous community of Castilla y León is shown in Tables 3 and 4.

In both cases, the explanatory variable (mycological production and productivity respectively) accounts for approximately 80% of overnight stays in the local action group areas. As a result, the fit may be considered good, with an R^2 above 0.8 in both cases. As a whole, the two models may also be deemed significant, since the F test indicates that the level of significance is above 99%. Since, after having conducted the relevant comparisons, no problems which might invalidate the results were found (self-correlation, heteroskedasticity, etc.), the model calculated can be extrapolated to all local action group areas, such that

Table 3. Summary of the models estimated

Predicting variable	R	R squared	R squared adjusted	Standard calculation error	F	Significance	Durbin-Watson
PBE	0.899	0.809	0.788	3,120.540	38.062	0.00016	2.079
Producte	0.897	0.804	0.783	3,156.123	37.007	0.00018	2.068

Dependent variable NP. Source: own.

Table 4. Summary of the models estimated -continuation

Predicting variable	Parameter	Lower limit	Value	Upper limit	Standard error	t	Significance
PBE	α	–7,497.118	–3,824.011	–150.905	1,623.719	–2.355	0.0429
	β	1.5424.694	2.436	3.3285321	0.395	6.169	0.0002
Producte	α’	–5,689.431	–2,388.658	912.116	1,459.126	–1.637	0.1360
	β’	23,3871.367	372,325.604	510,779.841	61,204.517	6.083	0.0002

Dependent variable NP. Source: own.

the parameters fitted may be used to predict and estimate the number of overnight stays in all rural areas in the region.

In this sense, the parameters associated to the predictive variables show the expected sign, where the greater the production value (or productivity) in the area, the greater the expected number of overnight stays. Moreover, after carrying out the t test, the two parameters were above 99% significant. As regards the constant term, only the one estimated through the production model was significant at 95%, the productivity term not proving significant[12].

Table 5 shows the mean values of the number of overnight stays and mycological tourists in the autonomous community of Castilla y León for each model. Data by local action group may be consulted in annex 1.

Mycological tourism in Castilla y León is generating almost 120,000 overnight stays (between 100,000 and 137,000 depending on the model estimated). Rural areas in Castilla y León are thus attracting over 42,000 pickers, from within the region itself as well as from other autonomous communities, the number ranging between 24,000 and 63,000, depending on the model chosen.

However, not all areas are able to attract mycological tourists. Specifically, in 10 groups in the case of the productivity based model, and in 24 groups in the production based model, the model failed to return a positive number of overnight stays. In these cases, estimations show that insufficient resources are generated to act as a factor to attract pickers, thereby failing to generate any kind of economic activity in the sector. In the remaining cases, the importance varies, with groups in which the number of overnight stays is very small and others where it emerges as an extremely important activity, as is the case of SEGOVIA SUR or ASOPIVA. As was found with the data calculated through surveys, this latter group proved to have the strongest appeal to mycological tourists, with an estimated 21,493 overnight stays (23,452 calculated), just over 5,000 mycological tourists according to the most conservative estimates (5,659 calculated) and some 10,000 in the least conservative (10,861 calculated).

Estimated expenditure associated with overnight stays/mycological tourists in rural areas in Castilla y León

Table 6 shows the expenditure variables estimated in terms of the hypothesis shown in the model. As can be seen, pickers who spend the night at a rural accommodation establishment in the autonomous community spend around 4.5 million euros, with a variation ranging between 2.8 million in the most conservative model and the 6.5 million in the least. For instance, in ASOPIVA almost one million euros is being generated each year, almost half a million in SEGOVIA SUR or over 200,000 euros in CUATRO VALLES (León). Expenditure generated in the remaining groups can be consulted in annex 2.

Table 5. Number of overnight stays and mycological tourists estimated for Castilla y León (2005)

Estimated variable (model)	Number of LAG areas with null value	Mean value	LAG with maximum value
NP(PBE)	24	101,992	21,203
NP(Producte)	10	137,744	21,783
MEAN	**17**	**119,868**	**21,493**
NTM(EM/PBE)	24	24,613	5,117
NTM(EM/Producte)	10	33,240	5,257
NTM(EC/PBE)	24	47,232	9,819
NTM(EC/Producte)	10	63,788	10,088
MEAN	**17**	**42,218**	**7,570**

Source: own.

Table 6. Estimated mean expenditure (€) derived from mycological tourism in Castilla y León (2005)

Estimated variable (model)	Number of LAG areas with null value	Mean value	LAG with maximum value
GNP(EM/PBE)	24	4,271,976	888,114
GNP(EM/Producte)	10	5,769,449	912,398
GNP(EC/PBE)	24	4,107,478	853,916
GNP(EC/Producte)	10	6,564,388	1,894,365
GNTM(EM/PBE)	24	2,855,714	593,683
GNTM(EM/Producte)	10	3,856,738	609,916
GNTM(EC/PBE)	24	3,918,648	814,659
GNTM(EC/Producte)	10	5,292,267	836,935
MEAN	**17**	**4,579,582**	**925,498**

Source: own.

[12] Since the model as a whole as well as the parameter corresponding to the explanatory variable are significant, the constant term's lack of significance ought not to invalidate estimations.

Estimated number of equivalent full-time jobs associated to overnight stays/mycological tourists in rural areas in Castilla y León

Finally, estimations of employment for all the models are shown in Table 7. In this instance, 46 equivalent full-time jobs would be created in rural areas in the region, with a minimum of 29 and a maximum of 66. During the season, this would mean 184 jobs that were dependent on pickers from outside the region staying in the autonomous community. Annex 3 provides a detailed analysis of the equivalent employment created in each group.

Table 7. Estimated mean employment generated by mycological tourism in Castilla y León (2005)

Estimated variable (model)	Number of LAG areas with null value	Mean value	LAG with maximum value
EMPNP(EM/PBE)	24	43	9
EMPNP(EM/Producte)	10	58	9
EMPNP(EC/PBE)	24	41	9
EMPNP(EC/Producte)	10	66	19
EMPNTM(EM/PBE)	24	29	6
EMPNTM(EM/Producte)	10	39	6
EMPNTM(EC/PBE)	24	39	8
EMPNTM(EC/Producte)	10	53	8
MEAN	**17**	**46**	**9**
MEAN DURING THE SEASON		**184**	**37**

Source: own.

This contribution can obviously not be interpreted as reflecting an equal number of contracts linked to mushroom picking related activities, but rather as support for overall employment deriving from edible wild mushroom picking, particularly for the hotel and catering sector. One further point is that this is an extremely important contribution as it comes at a time of the year when occupation rates in accommodation are lower than in the high season, particularly in summer and at Easter.

Summary

To conclude this section, we present a calculation of the relative impact of each of the estimated variables (overnight stays, number of mycological tourists, associated expenditure and employment generated) on rural tourism in the region, on the hotel and catering industry as a whole in the region, and on the overall economy of Castilla y León. All of these ratios are calculated for the minimum, mean and maximum values for the estimated variables (Table 8).

The number of overnight stays related to mushroom picking would account for between 7% and 10% of the total number generated by rural tourism in the autonomous community of Castilla y León, with an average approaching 9%. These values are slightly higher for the number of visits, with an average of 13% (between 7% and 19%). The contribution to the regional hotel

Table 8. Importance of mycological tourism in Castilla y León (summary)

Sectorial importance	Overnight stays	Number of mycological tourists	Associated expenditure	Employment generated
Minimum	*101,992*	*24,613*	*2,855,714*	*29*
%s regional rural tourism	7.6%[1]	7.6%[1]	Not available	Not available
%s regional hotel and catering sector	0.8%[2]	0.7%[2]	0.06%	0.06%
%s regional total	–	–	0.009%	0.003%
Average	**119,868**	**42,218**	**4,579,582**	**46**
%s regional rural tourism	**8.9%[1]**	**13.0%[1]**	**Not available**	**Not available**
%s regional hotel and catering sector	**1.0%[2]**	**1.3%[2]**	**0.09%**	**0.09%**
%s regional total	**–**	**–**	**0.014%**	**0.005%**
Maximum	*13,7744*	*63,788*	*6,564,388*	*66*
%s regional rural tourism	10.2%[1]	19.6%[1]	Not available	Not available
%s regional hotel and catering sector	1.1%[2]	1.9%[2]	0.13%	0.13%
%s regional total	–	–	0.020%	0.007%

[1] Calculated on the number of overnight stays or travellers in rural accommodation. [2] Calculated on the number of overnight stays or travellers at hotels and similar establishments, tourist complexes, camp-sites, specialised centres, rural houses and other kinds. It does not include people's own houses, rented accommodation or that belonging to relatives or friends. Source: own.

and catering sector as a whole is obviously much less and is around 1%.

As regards expenditure associated to this kind of tourism, no data are available enabling us to draw a comparison with rural tourism, although as expected it has little impact on expenditure in the regional hotel and catering sector, representing 0.09% of the total, and ranging between 0.06% and 0.13%. The difference in percentage terms with the impact of the number of overnight stays and mycological tourists is due to the fact that total expenditure includes that incurred not only by all visitors, whether staying at hotel establishments or not, but also by those resident in the region. The impact of this activity on the overall economy of the region is nominal, accounting for 0.014% of all expenditure in the region. The same may be said of employment, with 0.09% of the hotel and catering sector, and 0.005% of all employment.

Conclusions

The present study is the first to gauge the importance of mycological tourism in the economy of rural areas. Given the high explanatory power of the model developed, the authors feel that it might be used to estimate mycological tourism's contribution to the economy in other regions and areas endowed with such resources.

As expected, the values obtained do not point to any major impact on the hotel and catering sector or regional economy as a whole, but do suggest the relatively important weight this particular kind of tourism carries in rural tourism in the region. As a result, this market niche may help maintain a sector felt to be of vital importance in rural development policies in most autonomous communities. In this sense, the contribution this particular branch of tourism makes may be deemed crucial during periods in which occupation rates drop, thereby helping to offset one of the main setbacks inherent in this sector: high visitor concentration over only a few days of the year and the subsequent problems in terms of obtaining sufficient return on investments in the sector.

Public administration support for this sector is seen as a cornerstone in the strategy for developing rural areas endowed with natural resources, the management of which should adopt a twin horizontal focus. Firstly, a forest policy needs to be implemented, planning and resource control of which must embrace management of mycological resources so as to safeguard forest productivity and thereby ensure continued appeal to tourists. Secondly, a tourist infrastructure management policy needs to be in place for rural accommodation establishments to ensure sufficient quantity and quality thereof, suited to visitor needs. Action in aspects not directly related to the management of this kind of tourism should contribute towards its development, without neglecting vertical measures aimed specifically at promoting mycological tourism, such as those being successfully implemented by autonomous communities like Castilla y León or Andalusia.

However, the main problem facing this particular activity is one which fundamentally affects the whole resource management strategy, namely the enormous seasonal variability in mycological production. Estimated data may triple in exceptional seasons and fall to zero in the worst, years which may be considered poorer predominating over those deemed as better. In addition to seasonal variability, this introduces a further distorting factor when managing the activity.

It should also be remembered that not all rural areas hold an equal appeal. Even though visitor numbers basically depend on productivity, account needs to be taken of other variables that also have a major impact such as the proximity or remoteness of mushroom picking areas in Castilla y León to regions which have a long-standing tradition, as is the case of the province of Burgos or the northern part of the province of Soria and their proximity to the Basque Country. Another key factor is access from densely populated areas to places such as the southern part of the provinces of Segovia or Ávila, which are easily reached from large urban areas in Madrid. At the other end of the scale are provinces such as Zamora, Salamanca or even León which, despite having abundant mycological resources, lack the appeal of the features mentioned above, the contribution of mycological tourism to rural development suffering significantly as a result.

Mycology's contribution to the economy does, however, go beyond the data estimated in the present study. As a result, further research needs to be conducted along two lines. Firstly, an estimation should be made of the economic contribution of all visitors who come to an area and whose reasons for travelling include mushroom picking or enjoying what the area has to offer in mycological terms, regardless of whether they stay overnight or not. Secondly, an effort should be made to estimate the total contribution of all mushroom picking related activities, such as self-consumption, sale, transformation, etc. to overall

production, an input-output method perhaps providing a useful benchmark for calculation. Finally, the model developed should also be verified to ascertain whether it can characterise what contribution other kinds of tourism (such as cultural or wine tourism, etc.) may make to economies in terms of the specific tourist resources that various rural areas are endowed with, not only at a national level but also at an international scale.

References

Barke, M. (2004): "Rural tourism in Spain". *International journal of tourism research*, 6: 137-149.

Besteiro, B. (2003): "El turismo de congresos y reuniones en la comunidad autónoma gallega". *Papers de turismo*, 33: 128-147.

Boa, E. (2004): *Wild Edible Fungi. A Global Overview of Their Use and Importance to People*. FAO.

Courvoisier, M. (2000): "Le marché français des champignons sylvestres (importation, nature, organisation et apprisionnement), un débouché pour le Québec?" En *Les champignons forestiers: récolte, commercialisation et conservation de la ressource*. J.A. Fortin & Y. Piché (édit.). CRBF, Université Laval: 45-52.

Delmas, J. (1989): *Les champignons et leur culture. Culture actuelle et potentielle des champignons supérieurs*. La Maison Rustique. Paris.

Edouard, F. (2003): *El mercado de los hongos silvestres en Mexico*. Methodus consultora.

Familitur (2005): *Movimientos turísticos de los españoles: Castilla y León*. Instituto de Estudios Turísticos.

Fenández, A., Ceballos, B., Carmona, J. and Maynar, M. (2007): "El turismo ornitológico en España como modalidad emergente. Organización interna y caracterización de la demanda". *Papers de turisme*, 42: 41:56.

Frutos, P. de (2010): "Regulación de la recogida de setas silvestres comestibles y disposición a pagar por licencias de recolección: el caso de la provincia de Soria". *Spanish journal of rural development*, 1(3)

Frutos, P. de, Martínez, F. and Esteban, S. (2008): "Propuesta de ordenación comercial de los aprovechamientos micológicos a través de lonjas agrarias: análisis económico y financiero para la provincia de SoriA". *Revista española de estudios agrosociales y pesqueros*, 217:73-104.

Frutos, P., Martínez Peña, F., Ortega, P. and Esteban, S. (2009). "Estimating the social benefits of recreational harvesting of edible wild mushrooms using travel cost methods". *Investigación Agraria: Sistemas y Recursos Forestales*, 18(3):235-246.

Fuentes, R. (1995): *El turismo rural en España. Especial referencia a análisis de la demanda*. Instituto de estudios turísticos.

Hosford D., Pilz, D. Molina, R. and Amaranthus M. (1997): *Ecology and Management of the Commercially Harvested American Matsutake Mushroom*. USDA, 68 pp.

IET (1996): *Análisis de la oferta de turismo rural en España*. Instituto de estudios turísticos.

Juan, J.M. de (2006): "El turismo ornitológico: concepto y mercados". *Estudios turísticos*, 169-170: 165-182.

Lázaro, A. (2008): "El aprovechamiento micológico como vía de desarrollo rural en España: las facetas comercial y recreativa". *Anales de geografía*, 28: 111-136.

López, J. (2008): "El turismo ornitológico en el marco del postfordismo, una aproximación teórico-conceptual". *Cuadernos de turismo*, 21: 85-112.

Martínez De Aragón J. (2005): *Producción de esporocarpos de hongos ectomicorrícicos y valoración socioeconómica. Respuesta de estas comunidades a incendios forestales*. Tesis doctoral. Univ. de Lleida y Centro Tecnológico Forestal de Cataluña.

Martínez, F. (2003): *Producción y aprovechamiento de Boletus edulis Bull.: Fr. en un bosque de Pinus sylvestris L. Bases para la ordenación y valoración económica del recurso micológico forestal*. Serie técnica de la Consejería de Medio Ambiente. Junta de Castilla y León. 134 pp.

Martínez, F., Giner, M. and Lucas, J.A. (2003): "Primeros resultados del estudio del aprovechamiento micológico a partir de encuestas en la zona MYAS (Soria): recolección, micoturismo y ordenación del recurso". *Actas del I Congreso Nacional de Micología Forestal Aplicada, Soria*.

Martínez, F., Gómez, R. and Ortega, P. (2006): *Sistema de información geográfica sobre la producción, aprovechamiento y ordenación del recurso micológico en Castilla y León*. Junta de Castilla y León.

Mogas, J. and Riera. P. (2003): "Validación del experimento de elección en la transferencia de beneficios". *Hacienda Pública Española*, 165(2), 79-95.

Moreno-Arroyo, B., Romero, J., Calderón, A. and Calmaestra, E. (2007). "Micoturismo en Andalucía". *World Fungi 2007 Technical Presentation and Posters*; Junta de Andalucia — Consejería de Medio Ambiente.

Ordinas, A. y Binimelis, J. (2003): "El turismo de reuniones y de negocios en Mallorca". *Cuadernos de turismo*, 12: 35-52.

Palm M. and Chapela IH. (1997): *Mycology in sustains development: expanding concepts, vanishing borders*. Parkway Publishers Inc. North Carolina, 297 pp.

Pilz, D. y Molina, R. (2002): "Commercial harvests of edible mushrooms from the forests of the Pacific Northwest United States: issues, management, and monitoring for sustainability". *Forest Ecology and Management*, 155: 3-16.

Ponce, M.D. (2007): "Turismo de reuniones en la ciudad de Murcia". Un enfoque desde el tejido empresarial involucrado. *Cuadernos de turismo*, 19: 105-131.

Ribeiro, M. and Marqués, C. (2002): "Rural tourism and the development of less favoured areas: between theory and practice". *International journal of tourism research,* 4: 211-220.

Rico, M. (2005): "El turismo como nueva fuente de ingresos para el medio rural de Castilla y León". *Cuadernos de turismo*, 16: 175-195.

Roig, B. (2005): "Estudio descriptivo de la demanda española de turismo en casas rurales". *Revista española de estudios agrosociales y pesqueros*, 207: 181-196.

Solsona, J. (2001): "Turismo en espacio rural: el caso español". *Estudios y perspectivas en turismo*, 10: 11-41.

Starbuck C., Alexander S., Berrens R. and Bohara A. (2004): "Valuing special forest products harvesting: a two-step travel cost recreation demand analysis". *Journal of forest economy*. 10: 37–53.

Vargas, A., Porras, N. Plaza, M. Y Riquel, F. (2008): "Turismo enológico: comportamiento del turista y percepción de la población residente". *Papers de turisme*, 43-44: 97-112.

Velázquez, L. (2007): "El camino de la especialización". *Actualidad Leader*, 36: 20-21.

World Tourism Organization (1994): "*Recommendations on Tourism Statistics".* United Nations, New York.

Appendix

Annex 1. Overnight stays and mycological tourists in local action group areas estimated by models

Local action group	Province	NP (PBE)	NP (Producte)	NTM (EM/ PBE)	NTM (EM/ Producte)	NTM (EC/ PBE)	NTM (EC/ Producte)
ADATA	Zamora	1,686	2,180	407	526	781	1,010
ADECO BUREBA	Burgos	0	371	0	90	0	172
ADECO CAMINO	Burgos	0	0	0	0	0	0
ADECOAR	Burgos	0	0	0	0	0	0
ADECOCIR	Salamanca	6,183	3,403	1,492	821	2,863	1,576
ADEMA	Soria	950	172	229	41	440	80
ADERISA	Zamora	0	1,499	0	362	0	694
ADESCAS	León	0	1,831	0	442	0	848
ADEZOS	Salamanca	4,703	2,315	1,135	559	2,178	1,072
ADISAC-LA VOZ	Zamora	5,138	5,991	1,240	1,446	2,379	2,775
ADRECAG	Salamanca	2,298	3,442	555	831	1,064	1,594
ADRIMO	Ávila	0	179	0	43	0	83
AGALSA	Burgos	7,060	7,408	1,704	1788	3,269	3,431
AIDESCOM	Segovia	0	1,902	0	459	0	881
ARADUEY	Palencia	0	0	0	0	0	0
ASAM	Salamanca	1,686	3,725	407	899	781	1,725
ASIDER	Ávila	1,927	4,161	465	1,004	893	1,927
ASOCIO	Ávila	7,239	4,538	1,747	1,095	3,352	2,102
ASODEBI	León	1,614	3,600	390	869	747	1,667
ASOPIVA	Soria	21,203	21,783	5,117	5,257	9,819	10,088
CAMPOS Y TOROZOS	Valladolid	0	0	0	0	0	0
CENTRO VALLADOLID	Valladolid	0	0	0	0	0	0
CERRATO	Palencia	0	0	0	0	0	0
CODINSE	Segovia	0	1,177	0	284	0	545
CUATRO VALLES	León	7,443	4,160	1,796	1,004	3,447	1,927
DUERO ESGUEVA	Valladolid	0	601	0	145	0	278
HONORSE	Segovia	1,688	6,512	407	1,572	782	3,016
MACOVALL	Zamora	0	908	0	219	0	421
MERINDADES	Burgos	4,566	3,126	1,102	754	2,114	1,448
MONTAÑA PALENTINA	Palencia	0	3,711	0	896	0	1,718
NORDESTE SALAMANCA	Salamanca	0	1,199	0	289	0	555
OS ANCARES	León	1,596	8,802	385	2,124	739	4,076
PAÍS ROMÁNICO	Palencia	0	1,672	0	404	0	774
PALOMARES	Zamora	0	0	0	0	0	0
PARAMOS Y VALLES	Palencia	81	3,469	20	837	38	1,606
POEDA	León	0	0	0	0	0	0

Annex 1 (cont.). Overnight stays and mycological tourists in local action group areas estimated by models

Local action group	Province	NP (PBE)	NP (Producte)	NTM (EM/ PBE)	NTM (EM/ Producte)	NTM (EC/ PBE)	NTM (EC/ Producte)
PROYNERSO	Soria	3,086	2,428	745	586	1,429	1,125
RIAÑO	León	7,311	5,455	1,764	1,316	3,386	2,526
RIBERA DEL DUERO	Burgos	0	280	0	68	0	130
RUTA DEL MUDEJAR	Valladolid	0	332	0	80	0	154
SEGOVIA SUR	Segovia	10,217	15,017	2,465	3,624	4,731	6,954
TELENO	León	3,121	3,173	753	766	1,445	1,469
TIERRAS S, DEL CID	Soria	0	0	0	0	0	0
TIETAR	Ávila	1,195	5,852	288	1,412	553	2,710
TORGUVI	Zamora	0	1,369	0	330	0	634
VALLADOLID NORTE	Valladolid	0	0	0	0	0	0
TOTAL		**101,992**	**137,744**	**24,613**	**33,240**	**47,232**	**63,788**
MEAN		**2,217**	**2,994**	**535**	**723**	**1,027**	**1,387**

Source: own.

Annex 2. Expenditure estimated by models in local action group areas (€)

Local action group	Province	GNP (EM/ PBE)	GNP (EM/ Producte)	GNP (EC/ PBE)	GNP (EC/ Producte)	GNTM (EM /PBE)	GNTM (EM/ Producte)	GNTM (EC/ PBE)	GNTM (EC/ Producte)
ADATA	Zamora	70,628	91,327	67,908	87,811	47,213	61,050	64,786	83,774
ADECO BUREBA	Burgos	0	15,553	0	14,954	0	10,397	0	14,267
ADECO CAMINO	Burgos	0	0	0	0	0	0	0	0
ADECOAR	Burgos	0	0	0	0	0	0	0	0
ADECOCIR	Salamanca	258,970	142,539	248,998	137,051	173,115	95,284	237,551	130,750
ADEMA	Soria	39,794	7,199	38,261	6,921	26,601	4,812	36,502	6,603
ADERISA	Zamora	0	62,769	0	60,352	0	41,959	0	57,577
ADESCAS	León	0	76,683	0	73,730	0	51,260	0	70,340
ADEZOS	Salamanca	196,995	96,978	189,410	93,244	131,687	64,827	180,702	88,957
ADISAC-LA VOZ	Zamora	215,219	250,950	206,931	241,287	143,868	167,754	197,418	230,195
ADRECAG	Salamanca	96,269	144,165	92,562	138,614	64,353	96,371	88,307	132,242
ADRIMO	Ávila	0	7,477	0	7,189	0	4,998	0	6,859
AGALSA	Burgos	295,692	310,281	284,306	298,333	197,663	207,416	27,1235	284,618
AIDESCOM	Segovia	0	79,647	0	76,580	0	53,242	0	73,060
ARADUEY	Palencia	0	0	0	0	0	0	0	0
ASAM	Salamanca	70,638	156,032	67,918	150,024	47,220	104,304	64,796	143,127
ASIDER	Ávila	80,729	174,264	77,621	167,554	53,966	116,491	74,052	159,851
ASOCIO	Ávila	303,212	190,081	291,536	182,762	202,690	127,064	278,133	174,360
ASODEBI	León	67,608	150,768	65,004	144,962	45,194	100,785	62,016	138,298
ASOPIVA	Soria	888,114	912,398	853,916	1,894,365	593,683	609,916	814,659	836,935
CAMPOS Y TOROZOS	Valladolid	0	0	0	0	0	0	0	0
CENTRO VALLADOLID	Valladolid	0	0	0	0	0	0	0	0
CERRATO	Palencia	0	0	0	0	0	0	0	0
CODINSE	Segovia	0	49,309	0	47,410	0	32962	0	45,231
CUATRO VALLES	León	311,741	174,255	299,737	167,545	208,392	116,485	285,958	159,843
DUERO ESGUEVA	Valladolid	0	25,188	0	24,218	0	16,838	0	23,105
HONORSE	Segovia	70,710	272,773	67,987	262,269	47,268	182,342	64,861	250,212
MACOVALL	Zamora	0	38,036	0	36,572	0	25,426	0	34,890
MERINDADES	Burgos	191,241	130,950	183,877	125,907	127,840	87,537	175,424	120,119
MONTAÑA PALENTINA	Palencia	0	155,433	0	149,448	0	103,903	0	142,577
NORDESTE SALAMANCA	Salamanca	0	50,223	0	48,289	0	33,573	0	46,069
OS ANCARES	León	66,843	368,660	64,269	354,465	44,683	246,441	613,14	338,169

Annex 2 (cont.). Expenditure estimated by models in local action group areas (€)

Local action group	Province	GNP (EM/ PBE)	GNP (EM/ Producte)	GNP (EC/ PBE)	GNP (EC/ Producte)	GNTM (EM /PBE)	GNTM (EM/ Producte)	GNTM (EC/ PBE)	GNTM (EC/ Producte)
PAÍS ROMÁNICO	Palencia	0	70,040	0	67,343	0	46,820	0	6,4247
PALOMARES	Zamora	0	0	0	0	0	0	0	0
PARAMOS Y VALLES	Palencia	3,409	145,282	3,278	139,688	2,279	97,118	3,127	133,266
POEDA	León	0	0	0	0	0	0	0	0
PROYNERSO	Soria	129,266	101,712	124,289	97,795	86,411	67,992	118,575	93,300
RIAÑO	León	306,232	228,486	294,440	219,688	204,709	152,737	280,904	209,588
RIBERA DEL DUERO	Burgos	0	11,717	0	11,266	0	7,833	0	10,748
RUTA DEL MUDEJAR	Valladolid	0	13,909	0	13,373	0	9,298	0	12,758
SEGOVIA SUR	Segovia	427,926	629,000	411,448	604,780	286,058	420,472	392,533	576,977
TELENO	León	130,705	132,900	125,672	127,782	87,373	88,840	119,894	121,908
TIERRAS S, DEL CID	Soria	0	0	0	0	0	0	0	0
TIETAR	Ávila	50,038	245,117	48,111	235,679	33,449	163,855	45,899	22,4844
TORGUVI	Zamora	0	57,347	0	55,139	0	38,335	0	52,604
VALLADOLID NORTE	Valladolid	0	0	0	0	0	0	0	0
TOTAL		**4,271,976**	**5,769,449**	**4,107,478**	**6,564,388**	**2,855,714**	**3,856,738**	**3,918,648**	**5,292,267**
MEAN		**92,869**	**125,423**	**89,293**	**142,704**	**62,081**	**83,842**	**85,188**	**115,049**

Source: own.

Annex 3. Employment estimated by models in local action group areas (equivalent jobs)

Local action group	Province	EMPNP (EM/ PBE)	EMPNP (EM/ Producte)	EMPNP (EC/ PBE)	EMPNP (EC/ Producte)	EMPNTM (EM/ PBE)	EMPNTM (EM/ Producte)	EMPNTM (EC/ PBE)	EMPNTM (EC/ Producte)
ADATA	Zamora	0.7	0.9	0.7	0.9	0.5	0.6	0.7	0.8
ADECO BUREBA	Burgos	0.0	0.2	0.0	0.2	0.0	0.1	0.0	0.1
ADECO CAMINO	Burgos	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ADECOAR	Burgos	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ADECOCIR	Salamanca	2.6	1.4	2.5	1.4	1.7	1.0	2.4	1.3
ADEMA	Soria	0.4	0.1	0.4	0.1	0.3	0.0	0.4	0.1
ADERISA	Zamora	0.0	0.6	0.0	0.6	0.0	0.4	0.0	0.6
ADESCAS	León	0.0	0.8	0.0	0.7	0.0	0.5	0.0	0.7
ADEZOS	Salamanca	2.0	1.0	1.9	0.9	1.3	0.7	1.8	0.9
ADISAC-LA VOZ	Zamora	2.2	2.5	2.1	2.4	1.4	1.7	2.0	2.3
ADRECAG	Salamanca	1.0	1.4	0.9	1.4	0.6	1.0	0.9	1.3
ADRIMO	Ávila	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1
AGALSA	Burgos	3.0	3.1	2.9	3.0	2.0	2.1	2.7	2.9
AIDESCOM	Segovia	0.0	0.8	0.0	0.8	0.0	0.5	0.0	0.7
ARADUEY	Palencia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ASAM	Salamanca	0.7	1.6	0.7	1.5	0.5	1.0	0.7	1.4
ASIDER	Ávila	0.8	1.7	0.8	1.7	0.5	1.2	0.7	1.6
ASOCIO	Ávila	3.0	1.9	2.9	1.8	2.0	1.3	2.8	1.8
ASODEBI	León	0.7	1.5	0.7	1.5	0.5	1.0	0.6	1.4
ASOPIVA	Soria	8.9	9.2	8.6	19.0	6.0	6.1	8.2	8.4
CAMPOS Y TOROZOS	Valladolid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CENTRO VALLADOLID	Valladolid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CERRATO	Palencia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CODINSE	Segovia	0.0	0.5	0.0	0.5	0.0	0.3	0.0	0.5
CUATRO VALLES	León	3.1	1.7	3.0	1.7	2.1	1.2	2.9	1.6
DUERO ESGUEVA	Valladolid	0.0	0.3	0.0	0.2	0.0	0.2	0.0	0.2
HONORSE	Segovia	0.7	2.7	0.7	2.6	0.5	1.8	0.7	2.5
MACOVALL	Zamora	0.0	0.4	0.0	0.4	0.0	0.3	0.0	0.4

Annex 3 (cont.). Employment estimated by models in local action group areas (equivalent jobs)

Local action group	Province	EMPNP (EM/ PBE)	EMPNP (EM/ Producte)	EMPNP (EC/ PBE)	EMPNP (EC/ Producte)	EMPNTM (EM/ PBE)	EMPNTM (EM/ Producte)	EMPNTM (EC/ PBE)	EMPNTM (EC/ Producte)
MERINDADES	Burgos	1.9	1.3	1.8	1.3	1.3	0.9	1.8	1.2
MONTAÑA PALENTINA	Palencia	0.0	1.6	0.0	1.5	0.0	1.0	0.0	1.4
NORDESTE SALAMANCA	Salamanca	0.0	0.5	0.0	0.5	0.0	0.3	0.0	0.5
OS ANCARES	León	0.7	3.7	0.6	3.6	0.4	2.5	0.6	3.4
PAÍS ROMÁNICO	Palencia	0.0	0.7	0.0	0.7	0.0	0.5	0.0	0.6
PALOMARES	Zamora	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PARAMOS Y VALLES	Palencia	0.0	1.5	0.0	1.4	0.0	1.0	0.0	1.3
POEDA	León	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PROYNERSO	Soria	1.3	1.0	1.2	1.0	0.9	0.7	1.2	0.9
RIAÑO	León	3.1	2.3	3.0	2.2	2.1	1.5	2.8	2.1
RIBERA DEL DUERO	Burgos	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1
RUTA DEL MUDEJAR	Valladolid	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1
SEGOVIA SUR	Segovia	4.3	6.3	4.1	6.1	2.9	4.2	3.9	5.8
TELENO	León	1.3	1.3	1.3	1.3	0.9	0.9	1.2	1.2
TIERRAS S. DEL CID	Soria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TIETAR	Ávila	0.5	2.5	0.5	2.4	0.3	1.6	0.5	2.3
TORGUVI	Zamora	0.0	0.6	0.0	0.6	0.0	0.4	0.0	0.5
VALLADOLID NORTE	Valladolid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL		**42.9**	**57.9**	**41.2**	**65.9**	**28.7**	**38.7**	**39.3**	**53.1**
MEAN		**0.9**	**1.3**	**0.9**	**1.4**	**0.6**	**0.8**	**0.9**	**1.2**

Source: own.