The Marketing of *Lactarius deliciosus* in Northern Spain[1]

Miriam de Román and Eric Boa

De Román, Miriam, and Eric Boa *(CABI Bioscience, Bakeham Lane, Egham, Surrey TW20 9TY, UK; tel:+44(0)1491829080; fax: +44(0)1491829100; e-mail: m.deroman@cabi.org; miriamderoman@hotmail.com).* The Marketing of *Lactarius deliciosus* in Northern Spain. *Economic Botany 60(3):284–290, 2006. We report the harvesting of an average of 4,000 kg of saffron milk caps* (Lactarius deliciosus *Fr.) per day during four to six weeks between mid-October and mid-November in a village of 200 inhabitants in northern Spain. Nearly every inhabitant picks saffron milk caps, for which they receive an average of 2 €/kg. A family of four could make a profit of 5,600–8,400 € in a season (average annual income per family in the area is 18,727 €). Pickers sell the harvested mushrooms either to a local middleman or directly to the buyer, who then takes the produce to the final point of sale, usually in Catalonia, where the demand for saffron milk caps is increasing yearly. This trade has occurred for 30 years, and began when saffron milk caps started to appear in the area after pine trees were introduced to replace the native oaks. This study provides evidence that the collection and marketing of wild edible fungi is a profitable task on a local and national scale.*

Key Words: Wild edible fungi (WEF), *Lactarius deliciosus*, saffron milk caps, marketing, trade, market chain, non-timber forest products (NTFP), *Pinus nigra*, *Pinus sylvestris*, pine forests, Spain.

There has always been an extensive and regular trade in wild edible fungi (WEF) but, until the last 15–20 years, little has been known about collectors and traders (Boa 2004). A small number of species are traded on a global scale, exported mostly from developing countries in tropical regions and destined for Europe, Japan, and North America. This trade has expanded considerably as countries such as China have adopted more liberal trade polices and as previously isolated countries in Eastern Europe have also grasped new possibilities for meeting a growing demand for *Cantharellus* spp. (chanterelles), *Boletus* spp. (porcini), and other species.

The export of *Tricholoma magnivelare* (Peck) Redhead from the Pacific Northwest region of North America to Japan began in the late 1980s and continues until this day. This valuable trade brought about a huge change in wider perceptions about the importance of WEF trade, mainly because the growth of the industry in places such as Oregon, Washington, and British Columbia has been well studied and documented. This was the first real opportunity to learn about the wider social, economic, and environmental issues relating to trade in WEF. Pilz and Molina (2002) provide a useful summary of key points and findings following a sustained period of research.

In Europe there are surprisingly few accounts of the trade in WEF, a notable exception being a study by Dyke and Newton in Scotland (1999). This is true despite growing concern about the impact of collecting on the sustainable production of WEF species and other fundamental questions involving land ownership. There are concerns about declines in production of larger fungi generally, and some useful information on WEF is provided in Perini (1998), though seen from a conservation perspective as expressed by mycologists. A general tendency to restrict collections, based on a precautionary principle (Arora 1991), pays little or no attention to the effects this might have on commercial harvests.

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Market demand for wild mushrooms and other non-timber forest products (NTFP) has increased to the extent that their commercial value may surpass the value of timber-based trade (Arnolds 1995). This change in importance has also come about because of a decline in forestry-based industries, which in some countries has been precipitated by logging bans, for example in North America (Tedder, Mitchell, and Farran 2000).

As the demand increases and rural communities struggle to find new sources of income, there is a growing need for better information on existing trade so that informed decisions can be made that both protect natural resources and allow their sustainable harvest. Forest planning and management has paid little or no attention to the harvesting of wild edible fungi, as studies in Spain have explained (Oria de Rueda 1991).

More recently, a series of studies in Spain have begun to reveal a surprisingly large number of WEF enterprises. Cèpes or porcini (*Boletus* spp.), chanterelles (*Cantharellus cibarius* Fr.), saffron milk caps (*Lactarius deliciosus* Fr.), and truffles (*Tuber melanosporum* Vitt.) are the main commercial WEF species traded nationally and exported (De Román and Boa 2004). A little-known study by Martínez de Azagra, Oria de Rueda, and Martínez (1997) provides much useful background detail on many WEF species while Samils et al. (2003) look in particular at truffles and their economic development. A market research study in Catalonia gives evidence that WEF play a major role in the rural economy of the country (Cervera 1997).

An unusual opportunity arose for us to study the trade in *Lactarius deliciosus.* We analyze the extent to which the collection and marketing of *Lactarius deliciosus* has affected a rural community in northern Spain. We describe for the first time the amounts of WEF collected, the revenue generated, and its general importance to those involved in the supply chain, and we provide evidence that the collection and marketing of WEF is a profitable task on a local and national scale.

The Study Site

The study was carried out in Buenavista de Valdavia, a village in the province of Palencia (Castille-Leon, northern Spain, Fig. 1) with 200 inhabitants. The trade of saffron milk cap started in this village around 1970, after an extensive reforestation plan undertaken in the 1940s and the 1950s that replaced the original *Quercus pyrenaica* Willd. forests with the more productive (in terms of timber) *Pinus nigra* Arnold and *Pinus sylvestris* L. (Martínez de Azagra and Oria de Rueda 2001). Locals soon realized that there was a new mushroom growing in their forests that was collected by people coming from other places, mainly Catalonia. They started to collect it themselves because they had heard it was a good way of making money, but not for their own consumption, since there was no tradition of eating this unknown mushroom.

The origin of this trade lies in the strong demand for saffron milk caps, known in Spanish as *niscalos*, from Catalonia. Catalonians have long esteemed wild edible fungi, eagerly seeking them for personal consumption and displaying a willingness to pay high prices in markets (Cervera 1997; Wasson and Wasson 1957). Palencia has a less obvious tradition, though local people have also collected and consumed wild edible fungi for many years, welcoming the availability of wild food as winter approaches. The species traditionally collected for own consumption in Palencia are *Calocybe gambosa* (Fr.) Singer, *Hygrophorus russula* (Fr.) Kauffman, *Marasmius oreades* (Bolton) Fr., and *Pleurotus eryngii* (DC.) Gillet (Martínez de Azagra, Oria de Rueda, and Martínez 1997). These local mushrooms do not seem to be threatened at all by the introduction of the new species through reforestation, because they all grow in other habitats rather than the pine plantations in which the saffron milk caps thrive. Locals still do not regard *L. deliciosus* as a mushroom worth eating, and they prefer the traditional species for their personal consumption.

L. deliciosus is not the only species involved in this well-established trade. Two other related species are also harvested: *L. sanguifluus* Fr. and *L. semisanguifluus* R. Heim & Leclair. No distinction is made between the fruit bodies of these two taxa and those of the main species. All three species are considered here under the common name of saffron milk caps.

The trading season usually lasts for four to six weeks, from mid-October to mid-November, although it varies depending on weather conditions. Information on the amounts of saffron milk caps collected and sold in Buenavista was

Fig. 1. Map of Spain showing the division of the country in regions and the location of the study site, Buenavista de Valdavia.

ascertained during a weekend in November 2002 by interviewing all the stakeholders involved in the market chain: those harvesting the mushrooms, those acting as intermediaries in the sale, and those in charge of purchasing the product and transporting it to the wholesale point, usually in Catalonia. According to the locals, the collecting season in 2002 was an average one, so the figures shown here can be considered as representative of the trade of *L. deliciosus* in the village.

It is important to notice that the first author (M. de Román) personally knew many of the local people interviewed. We had access to information which otherwise would have been difficult to obtain. Nevertheless, in some cases it was not possible to carry out the structured interviews as planned due to some pickers' and buyers' distrust of any investigation. Dyke and Newton (1999) encountered the same problem in their careful analysis of the commercial trade in WEF in Scotland, but they overcame these difficulties by informally asking questions similar to those used in the structured interviews. We also found this a good method to obtain information.

Results

Mushroom Pickers

Nearly every inhabitant (80–90% of a population of 200) in Buenavista de Valdavia collects saffron milk caps. Women and children often pick mushrooms on weekdays, while men join when they are done with their normal farming activities. These include growing cereals, potatoes, and beetroot; some also have cattle. Some farmers even reported abandoning their usual tasks while the mushroom season lasted because they found it was more profitable to pick saffron milk caps than to take care of their crops.

Local people had been harvesting saffron milk caps for about 12 years, although figures ranged between 30 years for the pioneer pickers and two years for newcomers. All reported an increase in demand for *L. deliciosus*, with more people involved in picking it every year. Indeed, mushroom pickers included not only people

from Buenavista but also people from neighboring villages up to 30 km away. Although they knew of smaller markets close to their own villages, they preferred to come to Buenavista because of the better deals they got due to the greater competition among buyers.

Picking Practices

The harvest starts early in the morning and lasts until the afternoon, with most pickers spending an average of six hours per day in the forest. They always go by car and drive 4–10 km to reach their favorite sites. The harvesting of saffron milk caps involves a lot of walking, mostly on steep slopes, and pickers would need to come back to their cars now and then to leave their produce. Pickers jealously guard knowledge of good sites and will not reveal them even to their closest friends or relatives.

The tools used for the harvesting usually consist of baskets or wooden boxes and a knife or a sickle. The wooden boxes are the containers in which the mushrooms are later sold to the buyer, and their advantage over the baskets is that the mushrooms need no further handling before they are sold and thus remain fresher. Buckets and plastic bags are forbidden because people believe they do not allow the spores of the collected mushrooms to fall and thus disperse in the forest. Pickers would be fined if they were caught using them by the Servicio de Protección de la Naturaleza, a branch of the rural police dealing with environmental topics.

Collectors carefully cut the stalk of the mushrooms at the base, never pulling them, clean them removing leaf and litter debris, and place them upside down in the container, taking care not to touch the gills to avoid the green color resulting from the oxidation of the exuded latex. Those showing maggots and insect damage are not collected, and very small ones (cap diameter <1.5 cm) are usually left behind for the next harvest trip. Pickers would wait at least two days before returning to the same site in order to allow the mushrooms to grow. Local harvesting practices appear to be uniform, nondestructive, and successfully acquired by collectors through experience without the need for codes of practice or obligatory training sessions, as demanded in the Pacific Northwest (Pilz and Molina 1996).

When asked about the best weather conditions for a good mushroom season, all pickers agreed that August storms were important, as were abundant rains in September and October. The temperature must not drop below zero C., and if it does, frosts should never last for more than five to seven consecutive days. Pickers affirmed that the best places for collecting are where there is pine mixed with native oak, and also areas where bushes (e.g., *Crataegus* sp., *Juniperus* sp.) and ericaceous plants are present.

Money Earned by Locals through Mushroom Picking

Pickers are paid an average of 2 €/kg, although the prices can range from 1 to 5 €/kg depending on the quality of the mushrooms and their supply and demand on a given day (we witnessed several telephone calls from a buyer to his middleman in order to tell him the price the pickers should be paid). At the beginning of the season, prices vary between 3 and 5 €/kg. The previous year's prices were as high as 12 €/kg., but that was an exception. In mid-season prices go down to 1 €/kg, and at the end of the period prices rise again but never reach the high figures paid at the beginning. Most pickers would go to collect saffron milk caps even if prices were as low as 0.40 €/kg, but below that price they consider it would not be worth it.

Considering that the average price paid to the collector is 2 €/kg, and having stated that each person collects an average of 25 kg per day, a family of four could earn 200 € per day, or 5,600–8,400 € in a four- to six-week season. The average annual income per family in the area is 18,727 € after tax, 2,824 € less than the average in Spain, so it is obvious that mushroom picking is a remarkable means of obtaining an additional income in this less-favored area of the country.

Licenses for Picking

Many pickers mentioned the fact that they used to need a license to collect saffron milk caps, but that this practice had stopped. It was difficult to control whether pickers had a license or not, and therefore fewer and fewer pickers would purchase one. This license system had been working for four years until the year 2001 (in 2002 only four people had bought a license, so the town council decided to give them the money back and abolish the license system), and only those registered in the official

residents list from Buenavista had the right to have one in order to harvest saffron milk caps within the forests belonging to the municipality. The license cost 30 € and entitled each person to collect as many mushrooms as desired. This brought about frequent incidents with people from neighboring villages because, even though they would have been willing to purchase a license, they were not allowed to do so because they did not live in Buenavista. Pickers from Buenavista would like to see the license system re-established, because they believe it helps sustain the resources and avoids the lack of respect that many outsiders were said to show for their forests.

The Middlemen

Buyers often have a middleman in the village who tells them when there are mushrooms available and provides a venue for the trade, getting a commission for the service. Locals believe that the middleman is more trustworthy than the buyer, and this is why they have become an essential part of the mushroom trade.

In Buenavista de Valdavia there are three middlemen, all connected with the three bars in the village. Two of them are the owners, while the third is the former owner of a bar and has been involved in the marketing of saffron milk caps for years. She continues to act as a middleman because she has an established network of pickers and buyers. The present owner of another bar reported he did not have any interest in the market, but he allows a buyer to use his bar as a venue for the trade, even though he would not get any commission for it.

Although we found that about half of the mushroom pickers dealt directly with the buyers, the middlemen seemed to be essential for many of them. Many pickers affirmed that they did not trust the buyers because they had been cheated (or at least felt so) when selling their mushrooms directly to them. Each picker usually sells his mushrooms to the same middleman, showing that the collectors need to place their trust in a given person to feel comfortable with the trade.

Each middleman deals with a single buyer, and although they agree on the price of the produce with the picker depending on the quality, the buyer always fixes a price bracket depending on the demand. We were not told how much commission the middlemen received, but it seems to be a profitable task since they had been involved in the saffron milk cap market for an average of ten years.

Mushroom Buyers

Seven buyers were found purchasing saffron milk caps in Buenavista the weekend the survey was carried out, three of them with the aid of a middleman as described above, and the other four without any intermediary. According to the locals, this is the average number of buyers who usually come to Buenavista, although in 1992, when the production of *L. deliciosus* was extraordinary high, up to 22 buyers were recorded in the village during a single day.

Buyers came from different regions: Castille-Leon, Castille-La Mancha, Comunidad Valenciana, and Catalonia, at distances ranging from 20 to 770 km from Buenavista de Valdavia. They came with their trucks when the season started and then travelled daily from Buenavista to the final sale point, which for most buyers is Barcelona (760 km from Buenavista). One of the buyers also reported going to Valencia (700 km), and another shipped mushrooms to Palma de Mallorca.

The saffron milk cap market takes place every day of the week, although Friday is a quieter day due to the fact that on Saturday the wholesale market in Barcelona is closed. This means that the buyers have to store the mushrooms for two days before taking them to the final sale point, and quality would deteriorate. Many buyers do not turn up on Friday in Buenavista.

The reasons why buyers reported coming to Buenavista to buy saffron milk caps were the abundance and the good quality, much better than those collected elsewhere.

A buyer from Castille-La Mancha said she took two months of unpaid leave every year from her job to devote herself to the marketing of saffron milk caps. Although she said it was strenuous work, she also said it was financially rewarding. She works in this trade with five other relatives, and they have two trucks. They start buying saffron milk caps in France and Andorra in September, then move to Buenavista at the end of October, and end up purchasing the last mushrooms of the season in Portugal in November.

Another buyer works for a company that employs 17 people throughout Spain, France, Portugal, and the Alps. He would start as early as

the middle of August to trade saffron milk caps in the Alps, and then travel south as the season progressed.

Buyers who do not have an intermediary in the village arrive in Buenavista at around 1800 and deal with the pickers until approximately 2100. Those buyers who have middlemen turn up in Buenavista only in the late evening to collect the produce purchased by the intermediary. They are thus able to visit more villages in order to gather a greater amount of mushrooms. Even though they have to pay the middleman a commission, they end up earning more money than the buyers who do not have an intermediary due to the larger scale of the trade in which they are involved.

After the market in Buenavista is over for the day, all buyers drive their trucks to the final sale point, a hard eight-hour overnight journey. In many cases, though, buyers are organized in such a way that they meet another truck halfway. This second truck is the one that reaches the final sale point, and the first truck is thus able to return to Buenavista and get ready for the market of the following day. This practice implies an increase in the number of people involved in the marketing, which in turn leads to a considerable rise of prices at the final stage of the market chain.

The Wholesale Market in Barcelona

The usual destination is the wholesale market of Mercabarna in Barcelona. It is the main wholesale outlet for wild mushrooms not only in Catalonia but also in the whole country. There, the mushrooms are sold to retailers and restaurants. According to Cervera (1997), 478 metric tons of saffron milk caps worth 1.5 million € are sold on average in Mercabarna every year, with prices ranging between 3.6 and 7.2 €/Kg. The origin of the saffron milk caps is not always stated, but Catalonia, Castille-Leon, and Aragon are recorded as the main producing regions. Saffron milk caps are always available from September to December, and in some cases also earlier or later, but never in March or April. Prices are highest in May and August, when only few mushrooms are available, and lowest in November (Cervera 1997).

Retailers and Restaurants in Barcelona

We visited several retailer stalls at La Boquería market in Barcelona in November 2002, and found that saffron milk caps were available in all the stalls which usually sell fruits and vegetables. They were divided into classes, and prices were 6.90–13 €/Kg for first class, 4.90–5.99 €/Kg for second class, 2.90–4.90 €/Kg for third class, and 0.99–1.49 €/Kg for broken pieces. We also went to several restaurants, and in all of them there was at least one dish prepared with saffron milk caps, which confirms that they are extremely popular in Barcelona.

Final Remarks

As much as four metric tons of saffron milk cap are traded daily in Buenavista de Valdavia, though on exceptional occasions this can increase to eight to nine tons. The area is very productive, although much depends on weather conditions and particular seasons.

Oliach et al. (2000) report one ton of *L. deliciosus* being collected and sold daily in Laspaúles, a village in the province of Huesca. Romá, Valios, and Colinas (1997) cite productions of 108.16 kg/ha of *L. deliciosus* in *Pinus sylvestris* forests in the central Pyrenees. Martínez de Aragon, Bonet, and Colinas (1998) and Fernández et al. (1993) say that those forests in which *Pinus sylvestris* is the dominant tree species seem to be the most productive ones in terms of wild fungi.

The market for *L. deliciosus* in this small area in northern Spain has developed smoothly to date. There are no obvious concerns about sustainability, and local regulation of the harvest has so far managed to keep both the collectors and the buyers in business. Other communities may well be contemplating or even experiencing commercialization of wild edible fungi, as suggested by the global overview presented by Boa (2004). More information about existing practices is needed to help plan the new schemes, and we would encourage others to examine more closely the trade in commercially valuable species.

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