Journal of Ethnopharmacology 138 (2011) 662–667

Contents lists available at ScienceDirect

Journal of Ethnopharmacology

journal homepage: www.elsevier.com/locate/jethpharm

Novel use patterns of *Salvia divinorum*: Unobtrusive observation using YouTube™

Ivan Casselman[a,*], Michael Heinrich[a,b]

[a] Southern Cross Plant Science, Centre for Phytochemistry and Pharmacology, Southern Cross University, Lismore, NSW 2480, Australia
[b] Center for Pharmacognosy and Phytotherapy, The School of Pharmacy (University of London), 29-39 Brunswick Sq., London WC1N 1AX, UK

ARTICLE INFO

Article history:
Received 12 May 2011
Accepted 30 July 2011
Available online 6 August 2011

JEL classification:
1.04: Central nervous system
2.136: botany
2.232: diterpenoids
2.312: hallucinogenic

Keywords:
Salvia divinorum Epling & Játiva (Lamiaceae)
YouTube™
Mazatecs
Traditional medicine
Psychoactive drugs
User generated content

ABSTRACT

Ethnopharmacological relevance and Aims: The traditional use of the Hallucinogenic sage, *Salvia divinorum* has been of ethnopharmalogical interest for some time. This plant, endemic to Oaxaca Mexico and traditionally used by the Mazatec, is now utilized worldwide for its psychoactive effects. This use demonstrates a novel use pattern which is distinctly different from Mazatec use. This study offers a new methodology to study emerging global plant use and assesses the users' experience with it. The aim of this research was to develop a new methodology to collect and analyze archived data on the World Wide Web, specifically videos which depict *Salvia divinorum* use.
Methods: The basis of the methodology for this project was unobtrusive observation which allows the researcher to observe without influencing the event which is being observed. Qualitative, ethnographic data was used in conjunction with quantitative meta data collected by a customized web crawler programed to archive YouTube™ data.
Results: Using this methodology enabled us to understand reported uses and the users' experiences as expressed on the World Wide Web. The main result of this research was the documentation of a distinct, novel use pattern of *Salvia divinorum* which has developed outside of Oaxaca; a use pattern which differs in a number of ways from traditional, Mazatec use. The majority of the YouTube™ videos analyzed were found to present indications of a positive *Salvia divinorum* experience. This result highlighted the contradiction between ethnographic data and what is reported by the media. Finally the representation of *Salvia divinorum* on YouTube™ (and by inference the WWW as a whole) is a growing phenomena.
Conclusions: While anthropological and more specifically medico-anthropological research has, for many years, embraced the dynamics of cultures, until recently, ethnopharmalogical research has generally focused on 'traditional' plant use, failing to capture the dynamic elements of plant/human interaction and framing research in the past or as decontextualized largely descriptive reports. Global migration and urban environments formed a basis for looking at the interplay of continuity and change. Such cultural dynamics are exacerbated by the opportunities which the WWW offers.

1. Introduction

While historically, ethnopharmacology has focused on what has been classed as 'traditional' plant use; recent decades have seen a faster and faster spread and exchange of useful plants and their products. What has been termed 'globalization' has in fact enabled people in diverse cultures to use products derived from 'exotic' sources like Native American medicine (e.g. *Echinaceae* spp., or *Serenoa repens* Hook. f.), Traditional Chinese Medicine, Ayurvedic Medicines or 'rainforest foods' (Wohlmuth et al., 1997; Schultes et al., 2001; Prance and Nesbitt, 2004) These modern uses generally differ from the local and traditional ones. While this is in no way a new phenomenon (Heinrich, 2010) diverse sociocultural, technological and political developments have dramatically accelerated this process. Some of these products have now become poster children of the power of the internet (Heinrich et al., 2010).

A unique case are psychoactive species, which generally attract considerable attention in diverse cultures. When a 'new' psychoactive species is incorporated into a culture and in the absence of cultural or legal (regulatory) restrictions, different modes of utilization are developed (Rios, 1984). An example of such a development is the use of *Salvia divinorum*, a Mexican sage endemic to a small region of Oaxaca, Mexico, which is a well known Mazatec medicinal and hallucinogenic plant. It is now utilized throughout the world for its psychoactive effects; a use pattern which is distinctly different from the Mazatec. This novel, World Wide Web (WWW) based, use pattern can be linked specifically to the video sharing site

* Corresponding author at: Southern Cross University, Southern Cross Plant Science, Centre for Phytochemistry and Pharmacology, Lismore, NSW 2480, Australia. Tel.: +61 2 6620 3356; fax: +61 2 6622 2080.
E-mail address: ivan.casselman@scu.edu.au (I. Casselman).

0378-8741/$ – see front matter © 2011 Published by Elsevier Ireland Ltd.
doi:10.1016/j.jep.2011.07.065

YouTube™. as such the example demonstrates how the internet creates new cultural uses and links.

To date limited methodologies on how to study the distribution of such knowledge and usage via the internet is available. Here we describe a methodology that allows for the collection of ethnopharmalogical data from the internet using digital trace, an unobtrusive data collection method. YouTube™ is a the world's largest video-sharing community used by millions to upload material they want to share openly and globally. We also demonstrate what can be achieved with this methodology. The use of *Salvia divinorum*, its novel use patterns and its representation on the internet, specifically YouTube™ highlight the scientific potential of such an approach.

1.1. Salvia divinorum

Over the past decade the use of the psychoactive Labiatae, *Salvia divinorum* (Epling and Jativa, 1962), a sage endemic to Oaxaca Mexico, has increased outside Mexico. This novel use pattern is distinctly different from the Mazatec use of the plant and has integrated itself into recreational use in both North America and Europe. *Salvia divinorum* was first botanically described in 1963 (Epling and Jativa, 1962; Reisfield, 1993; Siebert, 2003), the active compound, salvinorin A, was isolated in 1982 (Ortega et al., 1982; Prisinzano, 2005) and determined to be psychoactive in the early 1990s (Siebert, 1994, 2003; Vortherms and Roth, 2006; Appel and Kim-Appel, 2007).

As the identification of this species' psychoactive compound and the spread of the public use of the WWW in the early 1990s coincide, there is a strong, perceived link between this plant and the WWW (Bucheler et al., 2005). Over the last five years the WWW, specifically User Generated Content interfaces has been predominant in the dissemination of *Salvia divinorum* information (Griffin et al., 2008; Hoover et al., 2008; Psychonaut Web Mapping Project Final Report, 2010).

1.2. World Wide Web

It is clear that over the last decade the WWW has come to dominate the global exchange of information. As technology continues to develop, each global citizen has a growing number of options to share their knowledge and opinions with an international audience. Currently one of the quickest growing category of web content is User Generated Content, commonly known as Web 2.0 (Riva, 2002; Ochoa and Duval, 2008; Blythe and Cairns, 2009).

The term Web 2.0 first came into wider use around 2004 and its use is linked to a conference hosted by O'Reilly publishing in San Francisco in October of that year (O'Reilly and Battelle, 2004; Schroeder and Bailenson, 2008). It is now used as a descriptive term for a range of User Generated Content interfaces which allow users to easily develop and post multi-media content to the WWW (Clever et al., 2009). Examples include podcasts, blogs, social networking, wikis, social bookmarking, photo sharing, and video sharing. Prior to the development of Web 2.0 interfaces, generating and displaying content on the WWW required some working knowledge of Hyper Text Markup Language (HTML) and WWW network infrastructure. Now, with the advent of User Generated Content interfaces, little if any of this knowledge is required. By using a WWW-enabled computer or mobile device it is now possible for anyone to upload a variety of multimedia quickly and easily (Clever et al., 2009).

1.3. Unobtrusive measures

Unobtrusive measures, or non-reactive data collection has been used since the 1960s to collect and interpret archived human activity (Kazdin, 1979; Rathje, 1979; Webb et al., 1999). There is a wide array of evidence which human culture leaves behind. Archaeological artifacts, national and institutional records, garbage and digital artifacts on the WWW have the potential to tell rich cultural stories (Rathje and Psihoyos, 1991; Bernard, 2006; Wakeford and Cohen, 2008; Brown, 2009).

Digital trace (Janetzko, 2008), an unobtrusive measure derived from behavioural trace (Bernard, 2006), is a methodology which attempts to elicit cultural information archived on digital sources. In the emerging field of online research, digital trace is an effective way to collect the cultural text developed by contributors to User Generated Content sites (Hindmarsh, 2008; Lee et al., 2008; Snee, 2008; Welser et al., 2008). Advantages to this method are the elimination of the observer effect (Brown, 2009) and long-term data access for longitudinal analysis (Cole et al., 2008; Crouchley and Allan, 2008; Lee et al., 2008). The digital trace methodology described herein has been developed specifically to research *Salvia divinorum* videos posted on YouTube™.

There are over four hundred videos (June, 2009) which depict people smoking *Salvia divinorum* and the resulting effects from this psychoactive plant. Over the last 5 years the video sharing site YouTube™ has been a predominant example of a Web 2.0, User Generated Content interfaces. Their slogan "Broadcast Yourself" embodies a new, online, social paradigm which users can easily share videos, up to 10 min long, with the rest of the world (Burgess and Green, 2008; Snee, 2008; Santos et al., 2010). YouTube™ is a vast digital archive of human behaviour (Milliken et al., 2008; Blythe and Cairns, 2009). It is the fourth-most accessed web site on the WWW and is responsible for nearly 10% of total online traffic (Cheng et al., 2007). Since 2006 there have been a growing number of videos posted on YouTube™ showing people experiencing the effects of smoking *Salvia divinorum* (Lange et al., 2009). This novel use of *Salvia divinorum*, as represented on YouTube™, lends itself well to digital trace for a variety of reasons (Wesch, 2009). When smoked, the effects of *Salvia divinorum* dissipate within 10 min, which is also the maximum video length for YouTube™ clips. The average user of *Salvia divinorum* is 23.4 ± 8.7 years old (Baggott et al., 2004), which is similar to the average age range of YouTube™ participants (23–26; Wesch, 2009). The novel use of *Salvia divinorum* does not have a specific geographic location; therefore YouTube™ based research provides access to informants which would otherwise be unavailable in standard ethnographic research.

2. Methods

To conduct this study, data collection methods had to be adapted and modified and data collection tools used in new ways to fulfill the data content. Data on *Salvia divinorum* as represented on YouTube™ was collected from January to July 2009. The data from YouTube™ was collected in two ways, first direct, ethnographic, observations was made of 100 YouTube™ videos which showed experiences of people smoking *Salvia divinorum*. Second, ContextMiner (Shah, 2010), a User Generated Content crawler, was programmed to crawl and archive YouTube™ meta-data:

> "ContextMiner is a framework to collect, analyse, and present the contextual information along with the data. It is based on an idea that while describing or archiving an object, contextual information helps to make sense of that object or to preserve it better. This website provides tools to collect data, meta-data, and contextual information off the Web by automated crawls. At present, ContextMiner supports automated crawls from blogs, YouTube™, Flickr, Twitter, and open Web. It also collects in-links information for YouTube™ videos from the Web" (Shah, 2010).