

STRATEGIES FOR SCIENTIFIC COMMUNICATION OF PRECISION AGRICULTURE IN BRAZIL

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ABSTRACT

Scientific knowledge popularization is the way to the society access technical scientific advances. The challenge is to increase the means, channels and processes of information and relationship with society and decode scientific issues into a format that makes knowledge accessible. The Embrapa Precision Agriculture Network has been used scientific communication strategies at the traditional and new media, as a way of approach with various stakeholders, contributing to the construction of a critical conscience of Brazilian society. The aim of this research is to present and evaluate the results of these strategies in scientific communication of the PA Network. For an efficient scientific communication is essential that the information have been transmitted in clear, simple, direct and easy to understand in a way to become it accessible to the public. Since the launched of the PA network in 2009 the strategies for scientific communication of PA as a website, educational videos and media reports have been adopted. The website (<http://www.embrapa.br/agriculturadeprecisao>) contains information about the project, activities, results and publications releases. Based on the reports generated by Google Analytics the website received more than 58,000 accesses, with around 190,000 page views and more than 42,000 visitors, with about 27% of return to the site. Social media can help to make science a closer experience of the public and the YouTube videos are an efficient tool. Internet videos were created and are available at the YouTube (<http://www.youtube.com/redeapvideos#p/u>) to disseminate the results and concepts of PA. The access to the videos focusing PA themes has been increasing and reached around 15,000 views. This access to the short videos format (with 2-3 min) has been an indicative of the public preference. Scientific journalism plays

an important role in decoding the scientific subjects for an accessible language to the public. So, the publication of articles in the media (newspapers, radio, magazines, television, internet) has been stimulated. Around 400 reports were published about PA Network activities and results indicating the increasing interest of the public on PA subject. The release of research results has been an efficient way of the project team approach to the society by showing the generation of PA knowledge in Brazil made by Embrapa and partners. It can also contribute to the strengthening and promotion of the concept of PA as a management tool for producers and service providers. It is also a form of accountability to society, indicating the destination of the financial resources.

Key words: communication, technological transfer, Google Analytics, Youtube.

Introduction

In 2009 Embrapa had established the Brazilian Precision Agriculture Research Network (PANet) with the objective of knowledge generation, tools and technologies development to enhance the agricultural production systems. The concept of Precision Agriculture (PA) for Embrapa is a management approach that takes into account the spatial variability of crop for economic and environmental return (Inamasu et al., 2012), reinforcing the view of knowledge chain in which machinery, equipment and applications are tools that can support such management. After four years of research and development activities one of the goals of the PANet sought to define and promote the concept of PA.

In order to achieve this goal PANet has been using scientific communication strategies at the traditional and new media, as a way of approach with many stakeholders, since the popularization scientific knowledge is the way to the society access technical scientific advances. The challenge is to increase the means, channels and processes of information and relationship with society and decode scientific issues into a format that makes knowledge accessible. For an efficient scientific communication is essential that the information have been transmitted in clear, simple, direct and easy to understand in a way to become it accessible to the public. So, the strategies for scientific communication of PANet have been adopted the use of a website, educational videos and media reports.

The educational and research organizations have increasingly using the internet as a vehicle for the dissemination of research results, knowledge sharing, networking and interpersonal relationships (Hartley & Bendixen, 2001; Greenhow et al,

2009.). One of the ways to seek to improve the use of websites and web pages can be through the measurement, collection and analysis of navigation data. To this end there web analytics are softwares such as Google Analytics translate into metrics all the specific activity at a site (Ledford & Tyler, 2007). There are some results in the recent literature on the use of Google Analytics tool in different fields of knowledge (Bhatnagar, 2009, Hasan et al., 2009; Turner, 2010). Educational videos are already being used long ago. The publication, access and dissemination of videos greatly increased since 2005 with the creation of the Youtube (Greenhow et al, 2009; Jones & Cuthrell, 2011). Youtube can be used as an effective teaching tool as shown by Duffy (2008), Greenhow et al. (2009) and Jones & Cuthrell (2011).

Scientific journalism plays an important role in the decoding of scientific issues for a language that makes knowledge accessible to the public.

The aim of this research is to present and evaluate the results of these strategies in scientific communication of the PA Network.

Material and methods

In April 2010 the PANet homepage (<http://www.macroprograma1.cnptia.embrapa.br/redeap2>) was launched. The website has been structured and organized based on the application server Zope 2.9.5/Plone 2-5/Python 2.4.3. Plone is a content management system (CMS) accessed through a browser. Zope tool (Z Object Publishing Environment) is a server with open source web applications written in Python language and database object-oriented (McKay, 2004).

Google Analytics (Clifton, 2008) was used to evaluate the site and provide the records. Data indicated visitor's profile, and the content accessed by them.

Internet videos were made with expert testimony on PA concepts and PA application on different crops, such corn, soybeans, cotton, rice, sugarcane, pasture, forestry, grapes, peach, apple, and integrated crop-livestock system. The 3-minute videos were edited using the Adobe Premiere Pro CS5.5 software. The 27 videos of PANet are available on Youtube (<http://www.youtube.com/redeapvideos#p/u>).

The publication of articles in the media (newspapers, radio, magazines, television, internet) has been stimulated by the journalists of the Embrapa research centers.

Results and Discussion

The website (<http://www.embrapa.br/agriculturadeprecisao>) contains information about the project, activities, results and publications releases. Based on the reports generated by Google Analytics the website received more than 58,000 accesses, with around 190,000 page views and more than 42,000 visitors, with about 27% of return to the site (Table 1).

Table 1. Visits to PA Network homepage (between April/10 and December/13).

Ano	Visits	Visitors	Access	Pages/ visit	Time (min)	New visits (%)	Rejection (%)
2010	2,263	1,612	9,308	4.11	3:02	70.2	55.9
2011	6,229	4,482	22,182	3.56	2:32	70.8	62.2
2012	23,550	16,953	84,778	3.60	4:16	71.2	58.1
2013	26,011	20,143	72,690	2.79	03:16	76.5	64.6
Total	58,053	42,700	188,961	3.25	03:35	73.5	61.4

Table 2 indicates that Brazil is, of course, the source of most hits. However, other countries like USA, Portugal, Paraguay, Colombia and Argentina also had some visits. These visits are surprising since most of the website content is in Portuguese, with only a summary in Spanish (<http://www.macroprograma1.cnptia.embrapa.br/redeap2/red-de-investigacion-en-agricultura-de-precision>) and another in English (<http://www.macroprograma1.cnptia.embrapa.br/redeap2/english-version>).

Regarding the Brazilian states, São Paulo leads accesses, followed by Rio Grande do Sul, Parana, Minas Gerais and Goiás States. But all other Brazilian states also accessed the pages of the PANet.

Scientific journalism plays an important role in decoding the scientific subjects for an accessible language to the public. So, the publication of articles in the media has been stimulated. Around 400 reports were published about PA Network activities and results indicating the increasing interest of the public on PA subject. Figure 1A illustrates the number of news reports in newspapers, radio, magazines, television, internet between 2009 and 2013. During that time a total of 400 media reports were published with references to the PANet research team.

Table 2. Origin of visits to the PA Network homepage (between April/10 and December/2013).

	Country	Visits	% Visit		Brazilian States	Visitas	% Visit
1.	Brazil	51,900	89.4	1.	Sao Paulo	14,514	25.0
2.	USA	1,288	2.2	2.	Rio Grande do Sul	7,598	13.1
3.	Portugal	1,115	1.9	3.	Parana	5,595	9.6
4.	Non identified	885	1.5	4.	Minas Gerais	4,758	8.2
5.	Paraguay	346	0.6	5.	Goias	2,213	3.8
6.	Colombia	291	0.5	6.	Mato Grosso	2,149	3.7
7.	Argentina	264	0.5	7.	Distrito Federal	1,936	3.3
8.	Germany	128	0.2	8.	Mato Grosso do Sul	1,786	3.1
9.	Spain	127	0.2	9.	Santa Catarina	1,690	2.9
10.	Uruguay	110	0.2	10.	Rio de Janeiro	1,529	2.6

Social media can help to make science a closer experience of the public and the YouTube videos are an efficient tool. Internet videos were created and are available at the YouTube (<http://www.youtube.com/redeapvideos#p/u>) to disseminate the results and concepts of PA. The access to the videos focusing PA themes has been increasing and reached around 15,000 views (Figure 1B). This access to the short videos format (with 2-3 min) has been an indicative of the public preference.

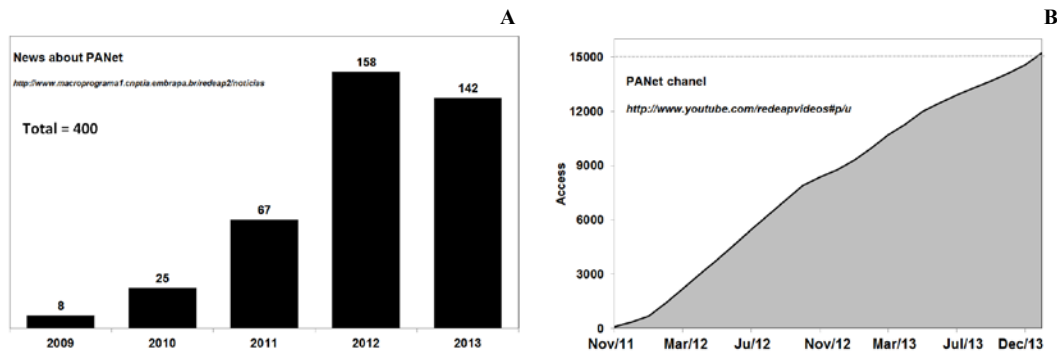


Figure 1. Number of news (A) in the media regarding the PA Network and number of accesses (B) to the PA Network videos at Youtube.

Conclusions

The release of research results has been an efficient way of the project team approach to the society by showing the generation of PA knowledge in Brazil made by Embrapa and partners. It can also contribute to the strengthening and promotion of the concept of PA as a management tool for producers and service providers. It is also a form of accountability to society, indicating the destination

of the financial resources.

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