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## **Trends in International Activities in Plant Pathology on the Internet**

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### **Abstract**

In recent years the information made available through the internet exploded. As a user it is difficult to keep the track or to decide between high and low quality websites. For plant pathology the internet became an invaluable tool to communicate and to exchange information. This is due to the fact that information is available without any delay all over the world and everybody can access it (unless the use is restricted). Major advantages of the internet in the field of plant pathology can be concluded for diagnosis, risk assessment, forecasting or alerting services. Beside these tools for practioneers a major impact of the internet can be seen for new interactive teaching and learning plat forms, true online Journals and Conferences will be created. And last but not least e-commerce will complete the wide range of possibilities. Agriculture and Plant Pathology as part of it will use the internet as the tool for exchanging information and for communication.

### **Diagnosis**

It is obvious that alle interactive media and tools are advantagous for diagnosing a plant disease and that these tools will have a major impact on diagnosis. One advantage is the use of high resolution pictures at nearly no additional costs. The introduction of digital imaging has made it very easy to use as many pictures or video clips as needed. So it has become a standard to use images to illustrate text. Diagnostic tools on the internet use images as an important factor in diagnosis.

A good example is the Plum Pox Virus Site in Amerika (Penn State University, <http://sharka.cas.psu.edu/>). This site concentrates on this specific virus disease and provides more than 150 high resolution images of the very different symptoms occuring on fruit trees. For Growers, who are uncertain, is this a very fast and easy way to clarify a possible high risk situation in their nursery.

Another advantage is the time frame in which publication is possible. In situation where a nearly immidiate information is needed the internet is the best suited tool to

dissaminate this. Sometimes this is accompanied by a mobile phone alerting system. So diagnosis through the internet could result in a more efficient way to communicate.

Another step is often made by so called “*disease clinics*”. The users/growers could send images of their (unknown) plant problems to the extension services. They will try to diagnose what might be the problem. But here images might be a critical factor, because images could be misinterpreted. An example might be the first case in the diagnostic quiz (Institut für Botanik und Pflanzenschutz, Germany, <http://www.fh-weihenstephan.de/va/institute/ps/quiz/index.html>). From the picture alone you can not conclude the cause of the problem. Diagnostic sites on the internet could give the impression that image are enough to solve a problem, but this is not true.

The aim of many sites is to comprises as many informations as possible, so that users do not have to visit other sites for collecting additional information. Information Technologies have made this approach possible by using dynamic databases and interactive linking. The leading publisher concerning plant pathology in this area is CAB International which have launched the Crop Protection Compendium, first on CD-ROM, but now also as a true internet version.

### **CAB International and the Crop Protection Compendium**



CAB *International* began in 1913 when a service was established in London to support agricultural scientists, in what were then British colonies, by identifying insects and providing scientific information and technical assistance. Subsequently, other organisms and disciplines were covered and the services brought together under the auspices of IAB, which was formally constituted in 1929. CAB and its services expanded further over the years that followed, and increasingly became used and valued worldwide.

CABI *Publishing* is a leading international, not-for-profit publisher in applied life sciences, including animal science, nutrition, integrated crop management and forestry. Their products have a global reputation for quality, relevance and authority, and are used in over 100 countries. CABI *Publishing* has always been at the forefront of electronic publishing, from the advent of online and CD-ROM to the more recent introduction of multimedia and Internet products. They are committed to the creation and distribution of the knowledge resources demanded by applied life science communities worldwide.

CABI *Publishing*'s compendia are encyclopaedic, multimedia tools for researchers, teachers, practitioners and information specialists. The content of each compendium is sourced from a broad panel of experts, edited and compiled by CAB International as an independent scientific organization, and resourced by a diverse international Development Consortium. Compendia are currently published on CD-ROM and will be available on the Internet. Regular updates are produced and hyperlinks are included.

Crop Protection Compendium - contains information on over 1,830 pests, diseases, weeds and natural enemies of worldwide or regional importance, each with text,

illustrations and a distribution map. Outline data are available for 10,000 species, all contained in an intelligent taxonomic framework. Data are included for more than 150 crops and countries. A novel system of hyperlinking allows dynamic links to be created in real time. Arrangement of the content in a large relational database facilitates identification of potential plant disease/pest problems, and points to control methods. The Crop Protection Compendium has been developed for Internet delivery in summer 2001. For more information see: <http://www.cabicompendium.org/cpc/>

The Crop Protection Compendium has become the information resource as a CD-ROM or internet version for plant pathologists throughout the world. The many features and the interactive linking has made it also the standard tool for diagnosis.

### **The Information Problem: Search Engines, Catalogues and Web Guides**

It is quite clear and it do not even has to mentioned that you can find nearly every information on the web, but how to find that single information you are searching for? There are several possible ways. Maybe you have read it somewhere (e.g. journal) and try the internet address or a friend tells you where to find a the website. But in many cases you do not know the internet address (URL) and have to find it via the web. In general you will use a search engine (e.g. Altavista, Lycos, Yahoo) or a web catalogue. And you assume that you will find the information by using such an engine. This might be true, because search engines can find a lot of web sites. But you have to be aware that in certain cases (and that is important for scientific sites) the site, which would give you the information you are searching for, is not listed. To avoid this problem you should use more than one search engine and you should try to be very specific, so that your search is narrow down to exactly that information you are looking for. Compare for example the results of Yahoo and Altavista by using the keywords: *powdery mildew triadimenol*. The first ten results given by both engines do not match. Try the same with Lycos and Yahoo, the first three are the same. That does not mean that Altavista is not as good as the other two, but it uses a different search algorithm to detect and find sites on the net. Now take into account that many scientific sites on the internet are not developed by IT experts. Their first aim is to publish high quality documents and sometimes they do not design their sites in a way that it can be easily found and categorized by search engines.

To summarize: To find information by using a search engine means to be specific and to narrow your search.. The main problem is that sites are not validated by search engines and that sites are not ranked by their content. Sites are ranked by search algorithms.

The other strategy to find scientific information is to rely on a web guide written by scientists working in your field of interest. For this purpose the *Plant Pathology Internet Guide Book (PPIGB)* was developed in 1996 and since then has become one of the prominent starting points in plant pathology with over 40.000 visits per month.



The *Plant Pathology Internet Guide Book* is a subject oriented internet resource guide for all aspects in plant pathology applied entomology and related sciences. The home page is located at:

<http://www.ifgb.uni-hannover.de/extern/ppigb/ppigb.htm>

One of the aims of PPIGB is to search and collect the important sites, to validate them, review them and to categorize them. In the moment PPIGB lists more than 3.500 webites in more than 25 categories. The aim is not to list all available sites but to give the major starting points in plant pathology.

One major advantage is you can browse or search through PPIGB and do not have to be specific. You just run through the listed site, read the short description and select the one you are interested in. You do not have to narrow down your search, because you will find already a presorted lists of high quality sites. And sometimes you will find sites which are not easy to find with a search engine. Try for example the abbreviation ISPP (nternational Society for Plant Pathology) and lets assume you do not know what it stands for (only that it is a plant pathology related site). With Yahoo you will not be able to find the site, with PPIGB you will be successful.

To summarize: a Web Guide like PPIGB will gives you a reliable starting point to explore the net. It is written by a scientists in that field and sites are presorted and validated. You will not find all sites available, but the major sites from where you can start your detailed search.

### **Impact of the Internet on Learning and Teaching in Plant Pathology**

Through the recent years more and more courses and course materials were made available though the internet. The advantage of providing course materials on the web is striking. Because the costs for publishing can be ignored, it is possible to provide everything necessary and appropriate from simple text files over images or little video clips. The students can read through the different materials in front of the course, because the course materials are archived on the net. And updating of information is simple and efficient. No additional print outs have to made, no rest of old copies and all students can get the latest version. But this would only affect efficiency in the distribution of course materials. It would not affect teaching or Learning, because the structures remain the same as before.

But the web offers new ways of Teaching and Learning. Distance Education, Training or Learning will change the whole Teaching-Learning-Environment completely and will have revolutionizing impact. During the last years courses were developed where it is no longer necessary that students attend a course in the traditional class room situations The Plant Pathology course held at the University of Nebraska-Lincoln was one of the first in this field where students were able to participate on-line (<http://plantpath.unl.edu/peartree/homer/index.html>). The login procedure guaranteed that the teacher is informed on the students which are online. A chat feature gives the teacher and students the possibility to ask and answer questions. A CD-ROM provided

to each student contains large files to reduce loading time during the on-line course. The advantages for students are striking – more flexibility.

For teachers is this development a new and exiting chance to develop new teaching models and courses, but it means also to change from traditional way of teaching to distance teaching without loosing at the same time the important contact to their students. Teaching, wherever it takes place (class room or on-line), is more than distribution of information, it is communication between teacher and communication. To think that it only takes an IT-expert and the necessary course material to build up an on-line course or an interactive learning platform will definitely be a dead end, because it breaks up the indispensable union of teacher and student. Some recent trends show alarming signals for separation of teachers from the development of implementing on-line learning platforms. In my opinion teachers (as experts of knowing what and how to teach) should be in the forefront of creating new teaching models accompanied by IT- and didactic-experts and not the other way round.



A thorough discussion took place during the first "Instructional Technology Symposium" (ITS 2001) located at :<http://ispp-itsymposium.massey.ac.nz/index.html>, which was the first true on-line symposium in the field of phytopathology held on behalf of the International Society for Plant Pathology (ISPP) and their Teaching Committee. It would go to far to summarize this on-line symposium here in detail. The archive will remain on-line, but one result could be drawn that the teachers should improve the teaching in their field and nobody else. Otherwise teaching would loose essential substance – it would be teaching without content.

The development and implementation of on-line learning platforms at universities would enhance their competitiveness towards other universities. The selection of a university depends no longer on where you live. You can live in Europe and study in America or wherever you want. The selection of a university will then depend on the quality of the courses and the reputation of the university, faculty and teachers. And universities co-operating with other universities will have a second benefit – they share teachers and offer students the chance to take part in practical courses without travelling over long distances. But again, this can only be successful if the teachers are driving force for these developments – otherwise it is hi-tech without content.

You will find distance education projects on many universities like the "Center for Educational development at New Mexico State University (<http://www.NMSU.Edu/~ced/>), the "Master of Science in Agronomy Distance Education Program" at Iowa State University (<http://masters.agron.iastate.edu/>) or the Tele-Education Project in New Brunswick (<http://teleeducation.nb.ca/>). In Germany the German Foundation of international Development (DSE) in close co-operation with the Carl-Duisberg Gesellschaft have established a project called Global Campus 21 (<http://www.gc21.de/>). Here students, who attend courses of these societies, have the chance to keep the contact after attending the courses.

## **Forecasting and Alerting Services**

I started with my discussion on "Diagnosis". In close relation to this are the following two topics "Forecasting and Alerting Services". The major advantages of the internet against traditional ways of communication in plant pathology are obvious. You can take the "Blue Mold Forecasting Center" (<http://www.ces.ncsu.edu/depts/pp/bluemold/index.html>) or the "Web-Blight" (<http://www.web-blight.net/>) project as examples. It is in depth information combined with the latest information available on the distribution and spread of a disease which demonstrate the superiority of on-line systems. New developments like the combination of on-line alerting systems and mobile phones (SMS-messaging) or the combination with precision farming tools (e. g. GPS) will cause tremendous changes in agricultural and horticultural systems.

The internet has proven its main advantages. It is now up to us to set it to work for us. It will change our ways of thinking, but it will not make scientists superfluous. The opposite will be the truth: Internet tools in plant pathology will be nothing without plant pathologists in the forefront. As said before – it would be hi-tech without content.