

Brave new communication

Information and Communication Technology (ICT) has during the last decade drastically changed the dissemination of information in Danish agriculture. ICT is now an integrated and indispensable part of the advisers' daily work, and farmers are increasingly using ICT in the management of all types of farms. This paper provides an overview of ICT in Danish arable farming.



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Organisation

■ The ICT services described in this paper are offered from the Danish Agricultural Advisory Service (DAAS) and the The Faculty of Agricultural Sciences (FAS). The collaboration between these two organisations goes back to 1996, when DIAS launched PlanteInfo, the first agricultural website in Denmark; the collaboration is now based on a formal agreement. Weather data, which are an important asset in PlanteInfo, are supplied by the Danish Meteorological Institute (DMI).

DAAS has a long history of producing agricultural ICT, including DOS and Windows applications. Most of the Windows applications are still in use, but new developments are exclusively delivered as Internet services.

Internet information Services

PlanteInfo (www.planteinfo.dk) is a web site for Danish farmers and advisers. The main objectives are to provide information on all aspects of crop production derived from local, up-to-the-hour weather data and weather forecasts, information derived from field observations by crop produc-

tion advisers, and information derived from interactive decision support systems utilizing the aforementioned data. The main topics covered by PlanteInfo are weather information, plant protection, irrigation, and variety selection.

LandbrugsInfo (www.landbrugsinfo.dk), in English *FarmInfo*, is a comprehensive website with more than 75,000 articles covering all aspects of agriculture. The information is organised in thematic pages. For crop production, growing guides are provided for all agricultural and horticultural crops; during the growth season, new articles on emerging issues are added on a daily basis. With a growth rate exceeding 20 new articles per day, LandbrugsInfo functions as the most important online archive for both farmers and agricultural advisers, who here find information on all farming aspects, rules and regulations, subsidies, etc.

Landmand.dk, in English *Farmer.dk*, is a new national agricultural Internet portal with news contents from several sources and links to relevant information. Landmand.dk has advanced facilities for farmers to create their personal pages with contents of their own choice.

Management Tools

DAAS offers a suite of inter-connected Windows programmes and Internet Service for crop production management, including planning tools for assigning field crops, determining fertilization in accordance with fertilizer regulations, planning and recording field operations as well as usage of machines, and management of stores of ancillary materials and products. A further facility is GIS for holding and presenting the outlay of fields on maps and orthophotos. New services are developed as Internet services and Windows programmes eventually will be substituted. Recordings can be done in the field using PDAs and subsequently uploaded to the online system. The kernel of these services is an online database, the Danish Field Database, which contains all the data, and which is available also for competitive service providers.

Furthermore, FAS, in cooperation with DAAS, is developing an online management system for fruit and vegetables growers and the food supply chain.

Decision Support Systems (DSS)

Decision support is available for crop protection, irrigation and variety selection, all of which can be found in PlanteInfo. Crop Protection Online is virtually an electronic and interactive representation of all Danish guidelines on major crop pests, diseases and weeds. The DSS yields a list of solutions, sorted by efficiency and costs, to concrete crop protection problems defined by case specific field observations. Pesticides are chosen from an online pesticide database. Crop Protection Online provides low dose solutions based on more than 1,500 field experiments conducted during the last 15 years.

The DSS for irrigation keeps records of the available soil water for a farmer's irrigated field, based on the weather data in PlanteInfo and the farmer's input regarding his irrigation. Information on soil water status now and a week ahead is presented graphically together with the crop's drought tolerance in the given growth stage.

The DSS for variety selection in cereals is based on variety trials by local Danish advisory centres. Trial results are uploaded to a central database, The Nordic Field Trial System and new variety information is available in PlanteInfo immediately, i.e. hours after harvest. The decision support part of variety information is a facility to compute expected economic returns taking into account the varieties' individual disease resistance and the farmer's actual knowledge of prices.

Sharing resources

Resources are widely shared by the Internet services. All services require login for full utility and personalization; the user database is shared, enabling the same login codes for all web sites. Weather data, as well as graphical presentations of weather data and weather forecasts, are supplied by PlanteInfo for presentation in LandbrugsInfo and Landmand.dk. Field data stored in Danish Field Database can be imported to PlanteInfo for use in irrigation and Crop Protection Online DSS. Web pages produced and presented by one web site can usually be shown on the other web sites without users being able to see them.

Sharing of resources is of great value by reducing data maintenance and software development costs.

Advisory support

The local advisory services are traditionally the most important customers for DAAS as well as FAS, according to the philosophy that knowledge is best disseminated to farmers by means of person-to-person contacts. Although the Internet in principle makes the middleman redundant, this is not the case in real life. On the contrary, professional Danish farmers increasingly buy services from the advisory organisations. Many of these services are carried out by means of ICT tools from DAAS, for example the obligatory fertilization planning in accordance with environmental regulations and nitrogen quotas.

The adviser is usually authorized to work with farmers' data and the adviser is often responsible for the basic maintenance of data. PlanteInfo has a facility named eAdvice, which enables advisers to work with the farmer's data, for example in setting up the irrigation DSS. A novel facility in eAdvice is to send SMS messages and emails to farmers. Hence, the adviser can send messages to e.g. all the farmers he is serving, defined groups of farmers, or farmers selected by a search in the Danish Field Database for specific crops, varieties, or production methods. This facility is gaining popularity, since the local advisory centres in this way still can offer personalized services to their customers despite the fact that the centres are constantly expanding in size in order to stay competitive. Many of the local advisory centres now subscribe all their customers to eAdvice.

Usage

In 2006 PlanteInfo had 1,500 users logging into the system regularly during the growing season, an



increase of 50% compared to 2005. Weather information is the most popular subject. 750 users have received 300,000-400,000 SMS with one or more types of weather information. The irrigation DSS had 300 subscribers actually using the system with recordings of irrigations, also an increase of 50%. Further 300 subscribers have created fields in the DSS without recording irrigations; some of these have used the DSS just to stay informed about water stress in their fields. Crop advisers are known to use PlanteInfo regularly and disseminate the information through other channels.

By the end of 2006, the Danish Field Information Database contained detailed information on crop and planned field operations for more than 17,000 Danish farms, an increase of 75% compared to 2005. A total of 2,500 users logged into the Field Information System 20,500 times in 2006.

The DSS on variety information, which is a system without identified users, was visited 15,000 times in 2006. Likewise, the database on pesticides had 157,000 visits in 2006.

Perspectives

Farmers' use of ICT in their daily work remains low, although the above-mentioned statistics show an increasing interest. The strategic shift from Windows based pc-systems to Internet services has made it much easier for the end-users to set up and access the systems. However, the irrigation DSS and Crop Protection Online DSS, as well as documentation systems require recordings in the field as input to regular use, which farmers are often not prepared to do. This concept for ICT applications is probably not well suited for practical use in large farms with very rational operation and management schemes. Further research needs to be undertaken in tailoring ICT applications to operation and management schemes in practise, to communication with online systems from the field through mobile or wireless Internet and to automation of data recording of field operations. ■