

VIPS - A WEB-BASED DECISION SUPPORT SYSTEM FOR CROP PROTECTION IN NORWAY.

Annette Folkedal and Christian Brevig
The Norwegian Crop Research Institute (NCRI),
Plant Protection Centre
Høgskolevn. 7
1432 Ås
Phone: +47 64949400 – Fax: +47 64949226
E-mail: annette.folkedal@planteforsk.no

ABSTRACT

In Norway, a web-based warning system called VIPS has been developed under a national government funded programme for reduced risk of pesticides used in agriculture. VIPS is a collaboration project between the Norwegian Crop Research Institute, Plant Protection Centre and the Norwegian Agricultural Extension Service. The aim of VIPS is to give open access to all the information needed for farmers to reduce their reliance on pesticides.

VIPS calculates warnings for more than 70 weather stations for several pests and diseases in selected fruits, vegetables and cereals. Registered users may adjust the climatic data used in the models and register field observations to get private warnings and use the system to record farm-practices.

VIPS is unique in several aspects:

- ✍ A general user-interface for all crops and all pests and diseases; the user gets a quick overview of which pests to look out for.
- ✍ Warnings are site specific and linked to an authorized weather station which supplies validated meteorological data. The extension service supplies the validated biological data necessary to run the models.
- ✍ The presentation is layered under the weather stations of each county. First level gives information of danger (red), possible danger (yellow) and no danger (green) for each model (past five days/coming five days). The next 3 levels give information of the specific model, historical data and exact values of the input parameters used in the models for the calculations.

Decision support system, warnings, weather data

PROGNOSIS AND WARNINGS IN NORWAY

In Norway potato late blight warnings has been produced and disseminated since 1957. These warnings were based on daily weather prognosis prepared by the Norwegian Meteorological Institute and disseminated through television together with the weather forecast. Apple fruit moth

prognosis has been given since 1979 and cereal disease warnings started in 1982. NORPRE (Magnus et al., 1991), a Norwegian version of the Dutch program EIPRE (Zadoks, 1981), was developed during 1982-85. 500 - 600 farmers recorded diseases and pests in their fields according to a pattern given by NORPRE. Leaf samples were sent NORPRE for identification and warnings were produced based on farmers' observations, historical

weather data, weather prognosis, disease and pest models. Communication was by mail, fax, phone and Bulletin Board.

In the early 1990's NORPRE was further developed and the service TELEWISE was established (Magnus, 1995). TELEWISE was an interactive telephone based warning system that covered warnings for several pests and diseases, weather forecasts and irrigation scheduling. In 2001 the already existing models for disease warnings were implemented in VIPS, a web-based decision support system.

NETWORK OF WEATHER STATIONS

The Norwegian Crop Research Institute has since 1987 established a network of automated weather stations situated in important agricultural districts (Sivertsen, 2000). By 2003 this network consists of more than 70 weather stations. Meteorological data from these stations are used in producing warnings in VIPS. The quality of the meteorological data is important, and the data is controlled by an automated control system (Sivertsen, 1998).

ESTABLISHING A NEW WEB-BASED DECISION SUPPORT SYSTEM

The web-based decision support system called VIPS has been developed under a national government funded programme for reduced risk of pesticides used in agriculture. The aim of VIPS is to give open access to all the information needed for farmers to reduce their reliance on pesticides. The use of Internet in collecting and disseminating necessary information creates new possibilities of cooperation between agricultural scientists and agricultural extension officers.

The Norwegian Crop Research Institute, Plant Protection Centre and the Norwegian Agricultural Extension Service started the design of VIPS in September 2000. With assistance from Accenture (a commercial company) a first release for selected fungal diseases, such as apple scab, potato late blight and powdery mildew and septoria in spring- and winter wheat, was introduced for the general public in May 2001. The Norwegian Centre for Ecological Agriculture joined the collaboration in 2002.

The web-address is: www.vips-landbruk.no

VIPS BY 2003

By 2003 VIPS calculates warnings for more than 70 weather stations for several pests and diseases in selected fruits, vegetables and cereals. The first page of the warning module shows a map of Norway with the different counties. One chooses which area to receive official warnings from by clicking the map, the list of counties or by selecting a crop of interest (Figure 1).

The user interface has been further developed by introducing the possibility for farmers to manipulate the weather parameters used in the different models and register field observations to get private warnings, to use the system to record farm-practices such as application of pesticides and fertilizers etc.

Another application in VIPS is a simulator for selection of means against weeds in cereals. This is an application developed by the Danish Institute of Agricultural Sciences (Rydahl, 1999). Based on information about the most common weeds in the field in addition to information about the crop (such as what kind of crop, growth stage and farm-practice) and weather conditions, the system selects candidate

herbicides and calculate the dosage needed.

VIPS also includes different calculators such as temperature-sum and precipitation for the different weather stations.

VIPS provides a link to Web-Blight, which is a collaborative Internet based late blight decision support application. Web-Blight has been developed by a NJF working group that has been investigating late blight epidemiology and warning systems in the Nordic countries since 1996 (Hannukkala et al., 2003).

Since 2002 the warnings produced in VIPS have been available on SMS. In collaboration with the Norwegian Meteorological Institute (NMI) the SMS service was further developed in 2003 to include local weather prognosis.

USER-INTERFACE

VIPS is unique in several aspects:

- ✍ A general user-interface is used for all crops and all pests and diseases. In this way the user gets a quick overview of which pests to look out for.
- ✍ The system is modulated in nine separate parts in a way that makes it possible to run the system before all modules are ready and makes it easy to add new crops and pests and models for their interaction.
- ✍ All warnings are site specific and linked to an authorized weather station which supplies validated meteorological data. The extension service supplies the validated biological data necessary to run the models.
- ✍ The presentation is layered under the weather stations of each county:
 - Warning for all pests and crops covered by the system, danger (red), possible danger (yellow) and no danger (green) for the

past five days and the coming five days, at the first level (Figure 2),

- Distance to the threshold value or the time of threshold crossing, presentation of several models or fields for the chosen pest or disease if available, at the second level (Figure 3),
- Historical data for a chosen period of time presented graphically or in tables, at the third level (Figure 4),
- Exact values of the input parameters used in the models for the calculations, at the fourth level.

All the web pages consist of three common parts:

- ✍ Logo–line on top of the page. By clicking the logo you will be taken to the homepage of VIPS, the Norwegian Crop Research Institute or the Norwegian Agricultural Extension Service. The homepage of VIPS give general information of the decision support system and dissemination of messages concerning the warnings, pests and diseases,
- ✍ Dynamic menu-bar to the left in the screen. The contents in the menu-bar differ based on which category of users you belong to. The sub-menu of the module chosen will always be shown on the top of the menu-bar,
- ✍ The content of the specific page.

DIFFERENT LEVELS OF ACCESS

In introducing such a new system, it is important to have a tight control of access to the data and the information submitted by individual farmers. Five categories of users are defined and given different levels of access:

- ✍ The general public have open access to all four levels of the warning system,
- ✍ Registered users can adjust selected weather data to local conditions and register biological data and application of farming techniques and get a private local warning,
- ✍ Authorised observers can register biological data which will be used as input to the warnings shown to the general public,
- ✍ Extension officers can read and validate the biological data submitted by the registered users who want such validation and distribute messages to the different categories of users, they can register new users who are members of their organization,
- ✍ System administrator can read, validate and change all data submitted and distribute messages to the different categories of users, register any new user. System administrator has access to tools for controlling the different automated jobs in the system and to manually start the different system jobs if necessary.

VIPS is linking the farmers, extension officers and the scientists together. The system is national covering a wide array of meteorological and biological conditions. Local advisers are necessary to get a good translation of the site-specific warnings to the farmers' fields. In a hilly and mountainous country as Norway the climate varies widely even over short distances and horizontal interpretation of meteorological data becomes rather erratic. Local advisers will also be used to validate the farmers input data. In this way the agricultural scientists will get a unique selection of validated historical biological data and weather data to use in refining the models.

REFERENCES

- Hannukkala, A., J.G. Hansen, A. Hermansen, B. Andersson & L. Bødker. 2003. Late blight epidemiology and warning systems in the Nordic countries. In: Niemeläinen, O. & Topi-Hulmi, M. (eds.). Proceedings of the NJFs 22nd Congress Nordic Agriculture in Global Perspective [online]. Jokioinen: MTT Agrifood Research Finland and NJF. Published 15.09.2003. Cited 01.10.03. Available at: www.njf.df/njf/reports/njfreports.htm. ISBN 951-729-772-6.
- Magnus, H.A., K. Munthe, E. Sundheim & Å. Ligaarden. 1991. PC-technology in plant protection warning systems in Norway. Danish Journal of Plant and Soil Science, 85 (S-2161): 1-6.
- Magnus, H.A. 1995. Plant protection warning systems in Norway. SP-report, Danish Institute of Plant and Soil Science, 15: 59-65
- Rydahl, P. 1999. Optimising mixtures of herbicides within a decision support system. Brighton Crop Protection Conference, Weeds, 3: 761 – 766.
- Sivertsen, T.H. 2000. Weather information, site information and a system for dissemination of information on the Worldwide Web from a network of 52 automatic agrometeorological stations. EPPO Bulletin, 30: 77-81.
- Sivertsen, T.H. 1998. Quality considerations for the data from a network of 52 agrometeorological automatic stations in Norway. In: Dalezios, N.R.(eds.): Proceedings from an International Symposium on Applied Agrometeorology and Agroclimatology, Volos, Greece, 24 to 26 April 1996. COST 77, 79, 711. EUR 18328: 323-328.

Zadoks, J.C. 1981. EPIPPE: A disease and pest management system for winter wheat

developed in the Netherlands. EPPO Bulletin 11 (3): 365-369.

Figure 1

The first page of the warning module shows a map of Norway with the different counties. One chooses which area to receive warnings from by clicking the map or the list of counties. In the sub-menu on top of the menu-bar one may also select a crop of interest.

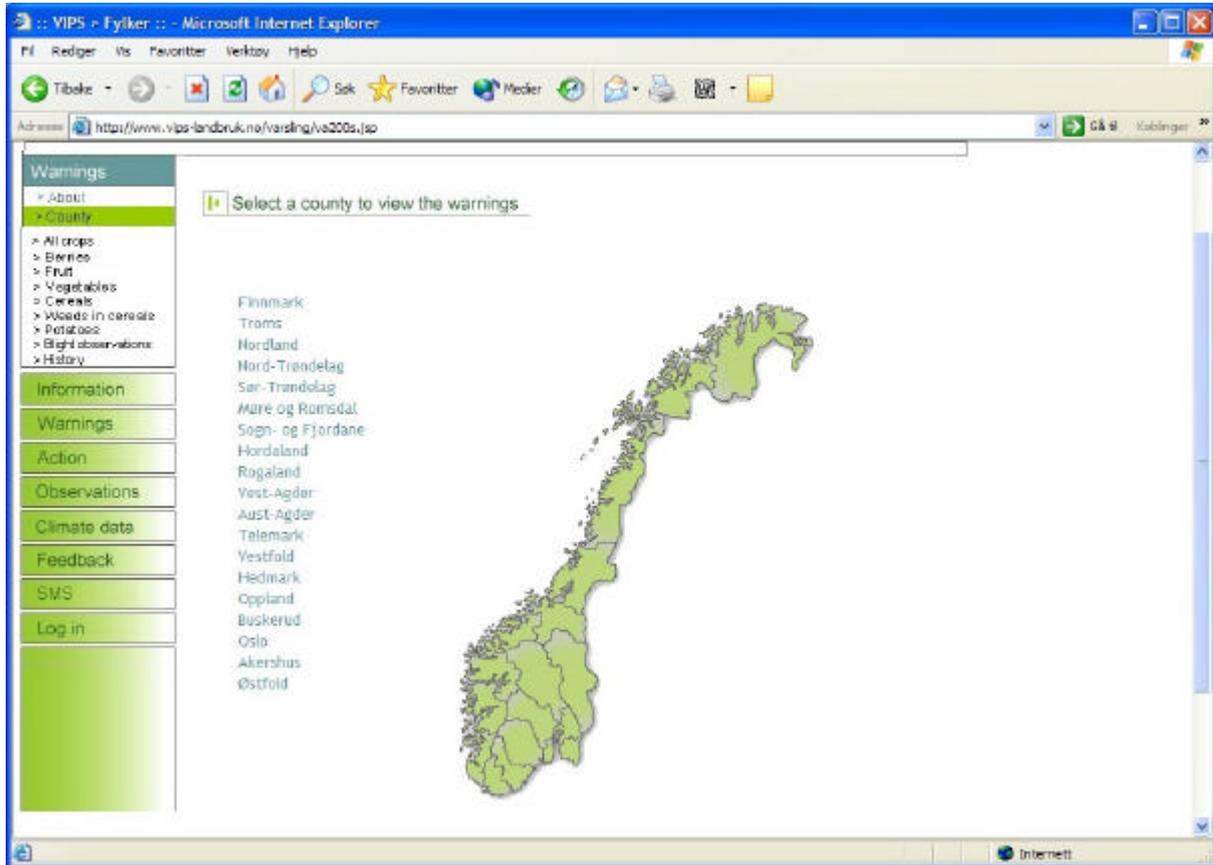


Figure 2.
The presentation of warnings is layered under the weather stations of each county.

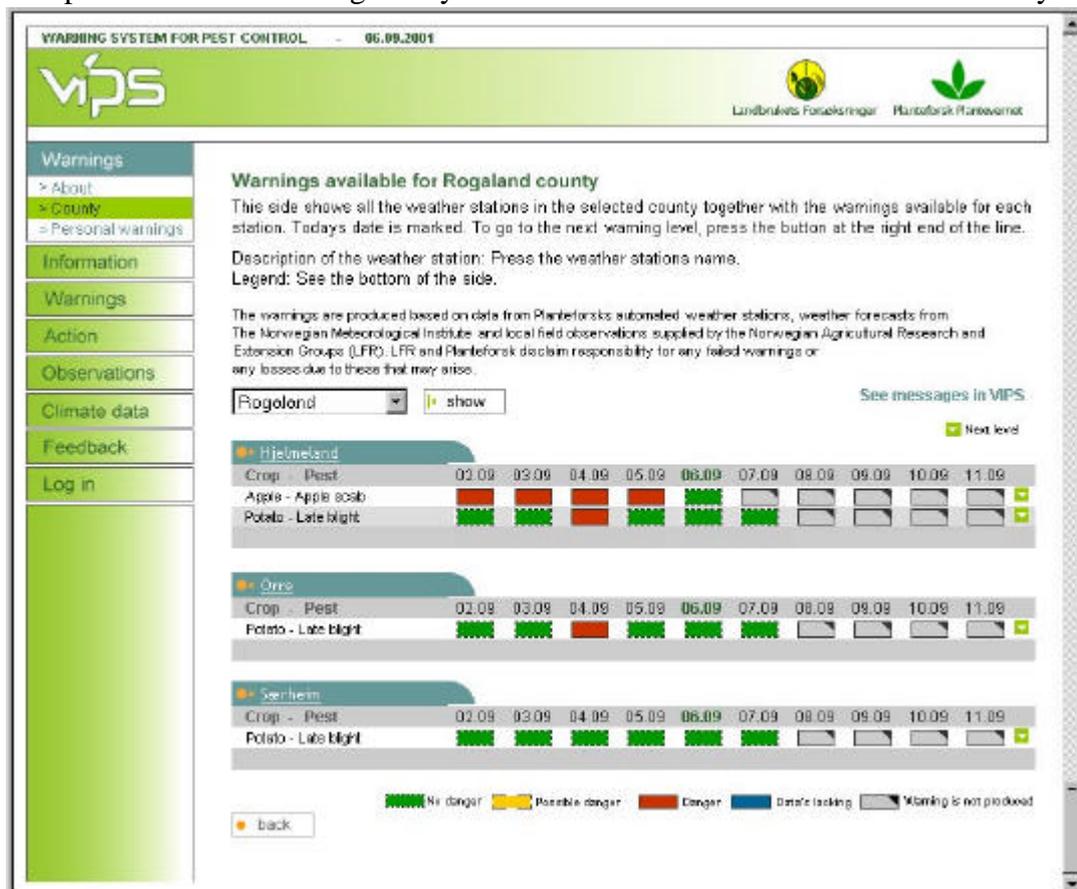


Figure 3.
 Presentation of several models for the chosen disease at the second level of the warning module.

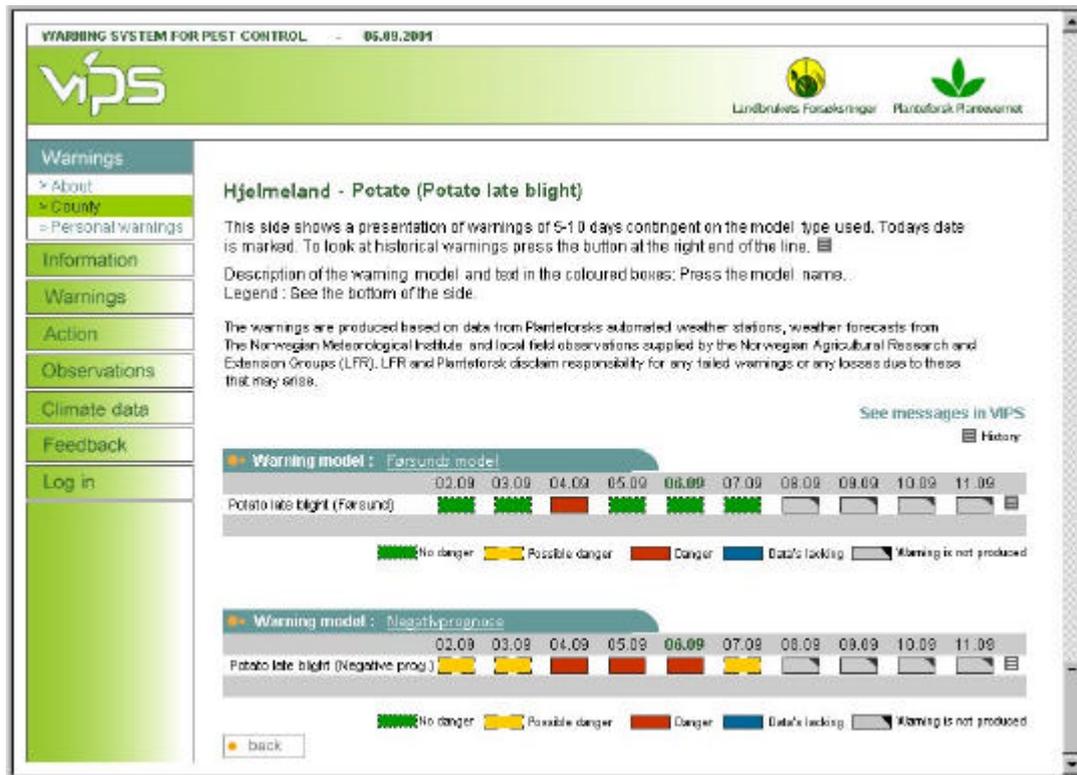


Figure 4.
Historical data for a chosen period of time presented in tables at the third level.

