

# VIP - Web-based Information System for German Agricultural Experimental Reports

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## Abstract

Economic and ecological conditions have constant and complex influences on agricultural production. New tasks for research develop from these circumstances, and experiments play a central role in this research. The documentation of the interpreted results as experimental reports is the precondition for the transmission of the results to science, advising, teaching and farming.

For an efficient access to experimental reports for the whole of Germany, a Web-based information system is being developed. The users will be able to search for experimental reports under different subject-related. They can then download the documents. An on-line recording system allows a decentralised entering of the documents by the institutions conducting the experiments.

## 1. Introduction

Economic and ecological conditions have constant and complex influences on agricultural production in Germany, and therefore create new problems for animal and plant production, horticulture and forestry.

In the research evolving from these problems, experiments play a central role. Information gathered from experiments is the inductive basis for answering a large number of questions.

Independently from the individual research area or research subject, in every case experiments pass through the stages of

- experiment planning,
- experiment execution,
- analysis, and
- documentation of the results.

The documentation of experiment results has a special importance for the transfer of the results and for the knowledge gain in practical agriculture.

The information gathered from experiments is the result of an intensive scientific analysis and of the interpretation of measured and observed data. This information is published in printed media like experimental reports, journals, weekly reports, monographs etc. In most cases, however, these printed products are only distributed to a fairly small number of addressees.

The expenditure for the publication of experimental reports - often done by the research institution itself-, the limited number of copies and the increasing costs for mailing prevent a

more general access to this important type of information. Therefore, it is necessary to look for new ways to disseminate the information. It is desirable to arrive at a more extensive exchange and a transparent presentation of the interpreted experiment results.

As a solution a model has been developed that is based on the following premises:

- The experimental reports are recorded in a central database while they continue to be kept as distributed information pools by federal government and state institutions.
- The project is realised as an on-line service on the Internet.
- The database is available to all participating institutions on the federal and state level and all other users authorised by these institutions.
- Corresponding to the federal structure of Germany, all federal and state institutions conducting experiments can participate.

This model has been realised as the federal- and state-supported "Experimental Reports on the Internet Project" (Versuchsberichte im Internet Projekt - VIP).

## 2. Goals of the Project

The VIP project intends to give access to a large number of locally kept experimental reports from a Web-based central entry point. This information strategy has the following goals:

- To create an overview of the existing experiment results (experimental reports).
- To use a synergy effect by focussing the access on descriptive data and contents.
- To support the planning of experiments.
- To give an effective access to experimental reports as well as reference information for teaching purposes, research, advising, administration, farming and other institutions that are conducting experiments.
- To guarantee the protection of copyrights and of access.
- To develop a useful basis for e-commerce.
- To organise a localised data management by decentralised data recording.

Existing local on- and off-line solutions for data presentation will continue independently of this project. This also implies that there will no editorial or technical changes in the reports that are supplied by the participating institutions.

In Germany, the federal government and the states are co-operating within the Information System on Food, Agriculture and Forestry (FIS-ELF) in the field of agricultural information and documentation. The Advisory Council Factual Data/Agricultural Informatics, a body of the FIS-ELF, is supporting the project as a joint initiative of federal and state institutions. The Advisory Council commissioned the German Centre for Documentation and Information in Agriculture (ZADI) with the realisation of the project.

## 3. A Tool for Agricultural Research

### 3.1. Contents of the Database

Currently, the VIP system contains experimental reports from experiments in plant production and horticulture. The project has been conceived in a way that it can integrate reports from other areas, as for example from animal production. The database collection consists of the experimental reports that have been printed. An experimental report is recorded as a document and in this form is available for retrieval. For optimal searching, the documents are described by meta data.

An experimental report can contain the description and interpretation of a single experiment, but it is also possible that several experiments are described together in one report. In this case, the document can take the form of a booklet. This fairly broad definition of the term document allows the participating institutions to use the kind of editing that is most adequate for their purposes. This approach facilitates the data management within the project. For the same reasons, the documents can be written in all data formats including those of table calculation and graphic programmes.

### 3.2. Data Retrieval

The retrieval functions of the VIP database reflect the different user habits and interests. For example, to see the current number of the reports made available by a certain research institution, a short overview is sufficient. A search for a report about a specific sowing procedure could be of interest for an agricultural advisor who is confronted with a question about a certain production method. Other retrievals can take the form of answers to repeatedly occurring questions, for example about reports on specific crops or specific experiment types (variety experiments, production technology tests, fertiliser experiments) as well as about reports supplied by a certain research institution. A different tool is necessary for users who want to make a free or full text search using their own search terms.

These varying approaches have to be realised in a way which is user-friendly and which makes optimal use of the existing database technology. The different search functions are:

- **General Search:**  
The general search function is based on a selection from lists. These lists contain the descriptor terms used in the meta data fields. For example, the general search function for plant production allows to search in the categories federal state, reporting institution, crop type, type of experiment, year of experiment etc. The corresponding reports will be sorted according to the categories and can be downloaded.
- **Key Word Search**  
The experimental reports are described by subject-specific key words which serve as meta data. The key words are included in a standardised list. This list is developed and maintained in co-operation with the project partners according to their needs and is used as a standardised descriptor list for the data input.  
For their searches, the users will have access to a database form that allows to search for key words with help of an alphabetically arranged bar.
- **Expert Search**  
Expert search is possible in a database form that contains all record fields which might be useful for a search. To simplify the use of this form, database fields that make use of a descriptor list (for crops, experiment type etc.) contain a list box.
- **Full Text Search**  
Full text search makes it possible to look in the meta data of the experimental reports for terms selected by the user. In addition, the term will also be searched in text of the documents themselves, which will be of special help for users who have little experience with the use of search forms.  
A special advantage of free or full text search is its usefulness for searches about current topics.  
As a result of the search the document is shown that contains the search term or terms. It is then available for further use.

### 3.3. Additional Services

Apart from the report database, VIP offers additional information services. The user has access to a handbook informing about the document search function, about the on-line document recording as well as about the description of documents with meta data. Furthermore, methods for avoiding and eliminating mistakes are explained.

Another section gives a directory of the projects participants. Under the heading "From Agricultural Experiments", notes on methodology, references to software and links to universities working about biometrics as well as links to scientific societies etc. can be found. To support the project, a category "VIP internals" has been created with a discussion list for the project partners where they can exchange ideas about scientific and project-related topics. Finally, the "VIP hotline" is available for users with urgent questions. Announcements about new developments by the project management can be found in the category "News at VIP".

### 3.4. Data Input

VIP is a federal and state co-operation project based on the principle of decentralised information management. The advantages in the development and operating of this approach are:

- The data input is decentralised by using an on-line recording system.
- The description of the experimental reports is done by the reporting institution which has the best knowledge for a correct presentation.
- It is possible for the institution conducting the experiments to send their data in complete independence from the working schedule of the system operators.

### Documents and Meta Data

The ZADI made available a unified Internet-based remote recording programme for the input of the experimental reports and the meta data. The recording of experimental reports in the database is done in two separate steps:

1. Description of the experimental report by using meta data in a standardised recording routine.
2. Storing of the report file (Binary Large Objects, BLOB) in the database.

It is even possible to record and send the meta data and the document itself independently of each other.

### On-line Technology - Recording of Files

At the reporting institution, the files (reports, reference files, documents about experiment results, treatises, publications, experiment guides) exist in different data formats. The person in charge enters the files using the remote recording programme into the order collecting system at the ZADI. While doing this, a recording routine creates a description of the files. For the purpose of entering the files, the recording institution will be given its own forms.

### On-line Technology - Entering of Meta Data and Linking with Objects

The aim of the description with meta data is that the document contents can be characterised with help of a standardised number of terms (meta data). The linking of the meta data record with the BLOB record takes place when the file description and the meta data records are found to be not contradictory by the programme. A 1:n relation is intended, that is, every meta

data record can have several objects (Word files, Excel files etc.). The linking of the meta data record with the BLOBs is done by the person storing the files.

### 4. Conclusions

The VIP project is a tool for agricultural research, science, advising, farming and administration that allows to consult for decision-making results from agricultural experiments from all of Germany. With VIP, a prototype for the use of decentralised data management between federal and state institutions has been created which integrates modern database technology and efficient Internet functionality.

The structural and functional characteristics of the VIP project allow to expand it into other fields, for example viticulture or forestry. With little expenditure, experimental reports from these areas could be integrated into the database.

In the future, the current two-phase procedure for the data recording will be changed to a direct data input into the database.

It can be imagined that additional information might be added as further step, like for example soil descriptions, climate data etc., so that the interpretation of the available information from the reports is improved and decision-making in agricultural research and administration facilitated.

