

Rationalisation of trials with a plot information system at the Institute for Plant Production and Cultural Landscape, HBLFA Raumberg-Gumpenstein, Austria

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Introduction

A plot information system, based on a relational database system, was implemented at the Institute for Plant Production and Cultural Landscape as an Intranet application. The input of new information and the correction of old information can easily be done due to the modular architecture of the system. The inclusion of new entries is easily possible due to the modular setup of the screens. The user needs no special knowledge to use the system. Background and motivation for this system is described in Resch & Graiss (2007).

As stated in the paper of Resch & Graiss (2007), data input works remotely over MS Access forms and an ODBC connection (Open Database Connectivity) to the PostgreSQL database server used and is hence implemented as a client-server/multi-user system. With this central data repository, we have one central source for all further use cases. A quality management takes care of the correctness and quality of the stored data.

Description of the system, workflow

As an introduction to the system, some definitions of terms are given:

Site: Collection of several permanent fields. The Research and Education Centre supervises several sites spread across all over Austria.

Main-field: Fixed rectangular area on a site for the implementation of specific trials.

Sub-field: A defined rectangular area of a main-field for the implementation of exactly one trial. In the course of time, different trials are hosted on a main-field and therefore the sub-fields are adapted accordingly to new trials.

Plot: A defined rectangular area within a sub-field. As stated above, in the course of time, different new trials are conducted on a sub-field and therefore the plots are adapted according to the treatments of the new trial.

Trial: Experiment to test a hypothesis under real world conditions and occupies one sub-field

Treatment: Part of a trial to test a specific factor of a trial (different fertilisation, seed...) and occupies a plot.

The workflow of the main use case presented in this paper provides necessary information for the daily work in trial management via our Intranet on the basis of web applications written in PHP (<http://www.php.net>). The first step is to lay out the trial plan by entering the basic data (configuration) of the specific trial with its treatments, including the creation of the necessary sub-field and plots (see below). This is done via input into the MS Access forms (see Figures 1 and 2).

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Referat: **Zuechtung** Versuchsname: **Lolium perenne**

Versuchs-Nr.: **ZU-430** Versuchsstation: **Gumpenstein** Nr.: **16**
ZU-431 Staat: **Osterreich**
ZU-432 Politische Gemeinde: **Irdning**
ZU-433 Postleitzahl: **9952** Mfr: **http://www.mafpro.at/** Gemeinde-Nr.: **61210**
ZU-434 Bundesland: **Land Steiermark** Bezirk: **LIEZEN**
ZU-435 Hauptproduktionsgebiet: **HPT) Hochlagen**
Kleinproduktionsgebiet: **EPG Ernsthilf und Seitentäler**

Neue Nr.: **436**

APK-Nr.: **3965** Anlagejahr: **2007** Hauptschlag-ID: **10**
APK-1-Stufe zeigen **betriebsw/sochw/soab** Hauptschlagstabelle zeigen

Bezeichnung Kostenträger:
Landw. Ressourcen: Erhaltungszüchtung standortgerechter Arten

Unterschlag-ID: **7** Unterschlagstabelle zeigen

Brutomeße des Schlags: Entensmaßes des Schlags:
Länge in m: **26,25** Breite in m: **90** Brutofläche in m²: **2372,5** Länge in m: Breite in m: Entensfläche in m²: **2254**

Anzahl Objekte: **1** Anzahl Parzellen (Einzelpfl.) gesamt: **1**

Datensatz anlegen Bemerkung: **Vermehrung Lolium perenne (GE09)**

Formular schließen

Fig. 1: Input form in MS Access for the field information system to define the trial.

Planungsprogramm Versuche-Detailtabelle

Versuchscode: **ZU-428** Variante: **Kennzahl** Kulturart: Dü-Regime: **Dü+glimme**

Filter löschen Anlagejahr: Kulturartab.: Sorten: Regimstab.: Saatstärke: Brutto: **Alles bezogen auf Parzelle; bei Einzelpflanzen: Anzahl Reihen +1 und Flächen +Flächenlat. (m) x Reihenanz. (m)**

Wiederholungen bei Einzelpflanzen - gesamte Anzahl an Pflanzen Wiederholung: Lagernummer: Mischungen: P: Anzahl Reihen: Düngung: Ernte: Reihenlat. cm: Bemerkungen

Nutzungen: Lagerartab.: Misch-Tab.: K: Reihenlat. cm: Bemerkungen

Nutzungszeit: Misch-Detail: Dü-Kommentar: Reihen-Maschinenbreite: < 15 cm (10 Reihen, 15 - 20cm 8 Reihen, > 20 cm 5 Reihen, bei Getreide 14cm osäßen, über 15 cm rechnen)

Planungstabelle für Details:

p	parz_br_m2	parz_du_lang	parz_du_breit	parz_du_m2	parz_ar_lang	parz_ar_breit	parz_ar_m2	bemerk	objekt_codem
104	13	8	104	13	7,5	97,5	Ökotyp Gumpenstein		ZU-4281
104	13	8	104	13	7,5	97,5	Ökotyp Gumpenstein		ZU-4282
104	13	8	104	13	7,5	97,5	Ökotyp Gumpenstein		ZU-4283
104	13	8	104	13	7,5	97,5	Guru		ZU-4284
104	13	8	104	13	7,5	97,5	Standardmischung Weingarten		ZU-4285
104	13	8	104	13	7,5	97,5	Standortgerechte Mischung		ZU-4286
104	13	8	104	13	7,5	97,5			ZU-4287
104	13	8	104	13	7,5	97,5			ZU-4288
104	13	8	104	13	7,5	97,5			ZU-4289
104	13	8	104	13	7,5	97,5	Dienst		ZU-42810
104	13	8	104	13	7,5	97,5	Rieger		ZU-42811
104	13	8	104	13	7,5	97,5	Rieger		ZU-42812

Planungstabelle für Details: **Anlage Verordnungsdaten (bei Versuche mit Wiederholungen)** Formular schließen

Fig. 2: Input form to define the treatments (MS Access).

Location and an internal trial reference are fed into the system. In this way a clear identification that runs through all the tables (Primary and Foreign Keys) is possible. For greater additional clarity for the user and backwards compatibility, a textual designation (trial code) is entered in a column as an abbreviation.

The positions of a main-field, its sub-fields and its plots are stored in three separate tables: One for the main-field, the second for the assigned sub-fields, and a third for the plots, all as bounding box coordinates. Thus, the location of each trial and treatment is determined by site, main-field, sub-field and plot. Each of these components is the reference for the following (site references main-fields, a main-field references its sub-fields and a sub-field references the plots).

The unit is centimetres and thus a very exact localization of every trial or even treatment on a site is possible. The complete data of the position of the sub-fields is kept even after the end of the trial. In this way, a history of trials set up on a specific main-field can be generated. The extension of the main-fields is not changed, only the sub-fields and plots are kept variable according to the need of the specific trial and determined during this set up process.

New sites with their main-fields can be added with little effort. An additional entry of GPS coordinates for the exact position of the respective site makes it possible to geo-reference the main-fields in a geographical information system (GIS).

Based on the trial reference (see above), the type of trial (for example clone maintenance, seed reproduction, or poly-cross systems), detailed specifications for this trial of any kind are generated automatically. For example, the area of each plot, the seed volume per plot, the number of seeded rows and the distance from the edge of the plot to the first machine-seeded row can be retrieved. The size of the plot varies in terms of gross area and the area fertilised or harvested. These numbers are recorded only once for each trial. The volume of fertiliser, for example, is given in kilograms per hectare; the specific amount of fertiliser necessary for the plot is calculated automatically through the defined fertilised area of the respective plot.

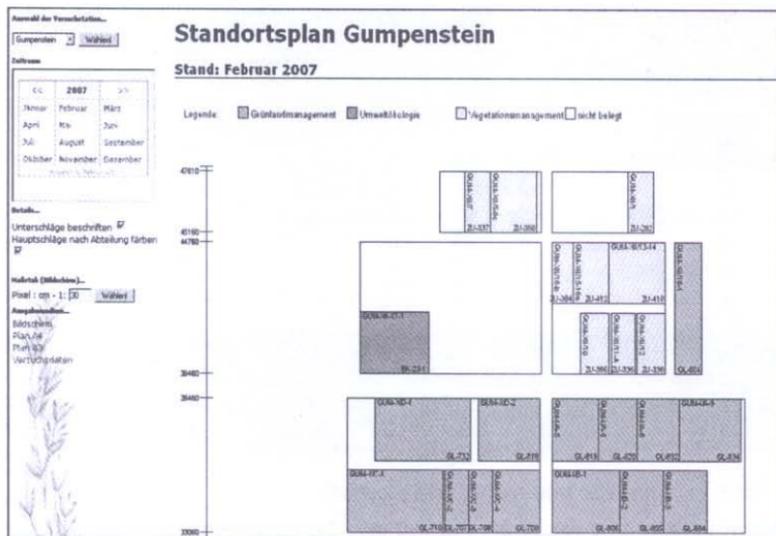


Fig. 3: Part of a plan of a whole site seen in the Intranet application (standard web browser): One can clearly see different main-fields with their sub-fields – one important use case for the data.

