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Phenotyper - a software tool for collection and management of phenotypic data using controlled vocabulary

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Plant breeding and genetics demand fast, exact and reproducible phenotyping. Efficient statistical evaluation of phenotyping data requires standardised data storage ensuring long-term data availability while maintaining intellectual property rights. This is state of the art at phenomics centres, which, however, are unavailable for most scientists. For them we developed a simple and cost-efficient system, the **Phenotyper**, which employs mobile devices (e.g. smartphones or tablets) or personal digital assistants (PDA) for on-site data entry and open-source software for data management. A graphical user interface (GUI) on a PDA replaces paper-based form sheet and data entry on a desktop. The user can define his phenotyping schemes in a web tool without in-depth knowledge of the system. In the Phenotyper, schemes are built from controlled vocabulary gained from published ontologies. Vocabulary and schemes are stored in a database that also manages the user access. From the web page, schemes are downloaded as extended markup language (XML) files for the transfer to the PDA and the exchange between users. On the PDA, the GUI displays the schemes and stores data in XML format (and also in comma separated value format). The user may define data types (integer, double, date, boolean, text, option lists) as well as validation patterns for text input and upper and lower value thresholds to enable a first validation step during data collection. Display of pictures (to support visual evaluation steps) as well as the storage of pictures taken during data collection is also possible. We decided to use the XML format for the data transfer since it guarantees a high level of unambiguousness and a certain persistence against corruption. The first version of Phenotyper has been developed for the operating system (OS) Windows CE about ten years ago. Since this OS is no longer supported - at least its mobile version - we are now working on a completely new version for Android, and, as a future plan, also for iOS. (*Reference: DOI: 10.1186/s13007-015-0069-3*)

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