agroXML -
A Standardized Data Format for Information Flow in Agriculture

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Abstract

There is considerable variation regarding format and definition of process and base data for decision making on farm, administrative, processor, trader and retailer levels. This causes difficulties concerning the interaction of different software solutions within these firms. A way out of this set of difficulties is offered by the standardised data exchange language agroXML. The concept of agroXML is based on the worldwide standard XML (eXtensible Markup Language). In the agroXML scheme the specific agricultural terms are stored and are explained in the agroXML dictionary.

The aim of this paper is to describe the background situation and to demonstrate the need of standardized data formats such as agroXML. In this context the information requirement of agricultural enterprises (inside the farm operation and between businesses) are described as well as the requirements of farm management and those deriving from quality assurance and traceability endeavours; account is also taken to data and information demands from public authorities to the agricultural industry. Additionally, the concept, the objectives, and particularly the various benefits of agroXML at different levels are explained. Finally, the state of the art in developing this standard and perspectives are described. Also the question of internationalization of the data standard will be raised.

Key words: agroXML, Data Format, Information Flow, Tracking and Tracing, Agro-Food Chain

1 Introduction

EU agricultural and consumer policy is currently substantially driven by social changes connected with animal, environmental and consumer protection. A recent example is the new EU basic provisions concerning food law (traceability in accordance with Art. 18-20 of Regulation (EC) no. 178/2002) has to be mentioned. It can be assumed that agricultural quality assurance will be a key competitive factor in the agricultural and food sector. In many European regions this situation meets an agricultural structure characterized by small farm enterprises on the primary production side, and also mainly small companies in upstream and downstream branches along the agro-food chain, including branch-specific software developers.

Generally, the availability of high-quality data from agricultural production processes is very good and especially as far as technical aspects are concerned. However, comparatively wide gaps still persist, in regard to systematic data and information management at the level of primary producers in agriculture as well as in other enterprises along the agro-food chain. There is also an increasing need for continuous, integrated documentation of agricultural and food production processes, covering farm operations,
transport, trade, storage, processing, and retailing to the consumer. Fig. 1 indicates the information requirement of agricultural enterprises (inside the farm operation and between businesses); additionally, the requirements of farm management and those resulting from quality assurance and traceability endeavours are described; account is also taken to data and information demands from public authorities to the agricultural industry are also taken into account.

![Diagram](attachment:image.png)

**Fig. 1: Data and information requirements in the Agribusiness sector**
(Source: According to Doluschitz, 2004 a and b)

Data describing the production process of agricultural products must meet the requirements that they are transferred through numerous EDP-systems and have to be applied by different software systems.

At the same time internet-based advisory services increase as well as the extent of information, which the suppliers of inputs, i.e. seeds, pesticides and fertilizer, provide via e-mail or by directly using the internet. Due to distributed data sources and software systems redundant data must be transferred repeatedly into different forms and into different formats. The error rate increases and many farmers reject redundant data input. The evaluation of data is complicated by missing comparability and terminological discrepancies.

Data suppliers meet a great variety of data formats, whose keeping is expected by the farmers and which all must be adjusted and updated, if the suppliers want to stay in the market.

The background situation and the concept of agroXML will be described in detail in this paper. Particularly, the various benefits of agroXML at different levels are explained. Further development requirements and perspectives will be indicated and discussed. Also the question of internationalization of the data standard will be raised.
2 The concept and objectives of agroXML

agroXML is a data exchange language developed for comprehensive data exchange which is at the same time independent from the manufacturer, especially in the agricultural sector. The concept of agroXML is based on XML (eXtensible Markup Language), which develops to a worldwide standard for describing documents. In the agroXML scheme the specific agricultural terms are stored and are explained in the agroXML dictionary. Already existing terminology standards will be included (ISO Bus for field farming and for livestock production, official pesticide list or certified variety list etc.). The scheme and the dictionary will be discussed and coordinated in an expert task force, so a high degree of acceptance will be attained. The results will be made available with the agroXML-repository in the internet and will be continually updated. With agroXML unproblematic data communication will be possible along the production and supply chain and with the agricultural administration (Fig. 2), with the advantage that farmers or other users need not to prepare and put already determined data separately into the system. An additional objective of agroXML is to enable the use of already determined data for several purposes without having to repeated data input or data processing. The basic technical needs for data exchange with agroXML will be available on the internet in the near future. The agroXML-scheme is freely accessible and can be implemented free of charge in different programs. The core information in the agroXML-repository can be extended with the concepts from the commercial and public service sector (see also Doluschitz und Kunisch, 2004; http://www.agroxml.de).

In summary, the objectives of the development of agroXML are

- the implementation of a generally acknowledged standardized data format to be widely used by all members of the agro-food chain,
- to avoid multiple data input at different levels of the agro-food chain and to minimize redundancy,
- to harmonize the discussion about the content and extension of the agroXML repository by involving experts from different origins on a neutral platform, and
- to increase and accelerate adoption.

![Fig. 2: Future communication enabled by agroXML](http://www.agroxml.de)
3 The benefits of agroXML

Potential users of agroXML include anyone along the production and supply chain in the agricultural sector.

3.1 Farmers

In future farmers will not be tied to a specific collection or processing of data during the extensive conversion of documentation duties. There is no need any more to register data. agroXML facilitates an obstacle free communication with the agricultural administration, consulting services and software companies possible, without requiring an extra data input. Any already determined and documented data for production processes, which has been stored in any software, e.g. in a file for different types, are available at any time for further use.

3.2 Consulting services

Integrated plant production requires that agronomic measures have to be adapted to the habitat conditions of the single type as well as to the needs of the plant. For conversion there are many instruments, which are partly available at the place of business, or have to be purchased (soil testing, monitoring of stock, weather station, warning system, models for prognosis, etc.) The potential of the integrated plant production may be fully and most effectively used by the farmer, if consultants and extension specialists will in future provide access to individual and type oriented choice with the help of internet technologies. This way of acquiring consulting services makes precision farming particularly interesting (Doluschitz und Jungbluth, 2004a and b).

Fig. 3: State of the art and future perspectives for agroXML

3.3 Software companies

The need of a standardized data exchange language like agroXML will increase and accelerate the development progress for agricultural software companies. Agricultural software is increasingly
dependent on the data input from outside the place of business. On the one hand this concerns the updating and care of forms and demands for application of subsidies, and on the other hand the use of information concerning the means of the business. The corresponding updates require more staff and cause higher costs, which can be reduced substantially if this information will be available in a standardized data format via the internet. Increasingly the customers will also expect that the software with systems for the business and type oriented online consulting services can communicate without problems, which will be much easier when applying agroXML.

4 Conclusions and perspectives

It is the aim of a currently running project to utilize technologies of a widely accepted internet based data exchange format for agriculture. For this the missing standards of specific fields must be defined within an ontological framework, especially those concerning concepts and rules. In this project the development and pilot application of the ontology concentrates on the production- and supply chain of potatoes. Together with pilot users the suitability of agroXML for the documentation of agricultural production processes as well as for data exchange with farm programs and online consulting services is checked (Fig. 3). In another project, concepts and the ontology concerning precision farming are transferred into agroXML. Further development of the agroXML concept has to consider international requirements according to language and terms implemented. This is a prerequisite for broad acceptance and to guarantee an accelerated development.

5 References


http://www.agroxml.de