

# QUANTITATIVE AND QUALITATIVE DEVELOPMENT OF NATURAL AND AGRICULTURAL SCIENCE RESOURCES IN THE AGRO DATABASE (2009–2016)

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**Abstract:** The types of natural and agricultural science resources contained in the AGRO database have been characterized and their dynamic development in qualitative and quantitative terms in 2009–2016 has been described. In addition, types of database records are presented, with justification for their differentiation by: records containing only a bibliographic description of the article, bibliographic records along with authors' affiliations, records with, in addition to the aforementioned elements, summaries and attachment bibliographies and records of the highest information value, most frequently searched by database users, in other words records containing full texts of articles. Furthermore, the database recipients and their information and search preferences based on surveys are defined. The use of AGRO in Poland and abroad is considered based on selected statistical data. The AGRO database development plans are discussed depending on the acquisition of funds for its maintenance and quantitative development and the multiplication of records with full texts.

**Keywords:** AGRO database, bibliographic databases, scientific information, life sciences, agriculture, bibliography, information technology

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## 1. Introduction

2017 is the 25<sup>th</sup> anniversary of the existence of the bibliography-abstract AGRO database. It currently registers 1060 scientific, popular and scientific journals in the field of natural sciences and agriculture that cover the spectrum of Polish scientific journals in these fields. The detailed thematic scope of the database is as follows: agriculture, forestry, food technology, nutritional science, dietetics,

human plant and animal diseases, animal husbandry, plant breeding, agricultural technology, melioration, gardening, wood technology, ergonomics, environmental protection, ecology, zootechnics, veterinary medicine, agricultural economics, biotechnology, biochemistry, microbiology, agro-tourism, wood industry, food industry, leather industry, refrigeration industry, meat industry, fermentation industry, fruit and vegetable processing, bakery and confectionery industry, environmental engineering, European integration with the EU legislation, quality management, business organization, food security, food management, surveying, etc. Over the years 2009–2016 AGRO underwent both quantitative and qualitative metamorphoses and was co-financed by the EU funds provided by the Main Library and the Information Center of the University of Life Sciences in Poznań [1].

## **2. Development and directions of development of the database and its scientific resources following the implementation of two EU projects in 2009–2015**

In the years 2009–2015, the Main Library and the Scientific Information Center of the Poznań University of Life Sciences carried out 2 EU projects:

1. “Extension and transformation of AGRO bibliographic database into bibliographic database using YADDA software” – Operational Program Innovative Economy, Priority Axis: Infrastructure of R&D, Measure 2.3. Investments related to the development of information science infrastructure, Submeasure: 2.3.2. Projects in the development of digital information resources. Project implementation period: 01.01.2009–31.01.2014. Project cost: 4,852,298.00 PLN;
2. “Adaptation of AGRO metadata to Polish Scientific Bibliography and POL-index” – Operational Program Innovative Economy, Priority Axis: Infrastructure of R&D, Measure 2.3. Investments related to the development of information science infrastructure, Submeasure: 2.3.2. Projects in the development of information science resources in the post Sub-measure: 2.3.2. Projects in the development of digital information resources. Project implementation period: 01.01.2014–31.12.2015. Project cost: 3,287,216.00 PLN.

The direct aim of the first project was to create a supraregional database containing information on the results and conditions of access to the results of research projects. The detailed objective was to expand the AGRO bibliographic database of the Main Library and the Scientific Information Center of the University of Life Sciences in Poznań. The project included the extension of the bibliographic descriptions (database records) to the abstracts of the documents described and the attachment to the individual bibliography records, if provided by the authors. These elements allowed the AGRO bibliographic database to be transformed into a bibliographic and abstract database. An important goal of the first project was to maintain the AGRO database on the Interdisciplinary Center for Mathematical and Computer Modeling at the University of Warsaw (ICM) using the YADDA software in the Virtual Learning Library [2].

The second aim of the project was to harmonize the AGRO database records and to implement new metadata elements [3] to ensure the consistency and standards with the Polish Scientific Bibliography and POL-index. The project enabled the use of AGRO metadata in the comprehensive evaluation of the scientific activity of scientific units through participation in the POL-on Higher Education Information System, through the Polish Bibliography. The AGRO database contains information about the publications of Polish scientific units and affiliated scientists. The AGRO database is available on the Library of Science platform, which is operated by the Interdisciplinary Center for Mathematical and Computer Modeling at the University of Warsaw. The application of standardized standards for the introduction of bibliographic descriptions to the database and the extension of the database records with the affiliations of all authors allowed the evaluation of scientific achievements of scientists. The inclusion of indexed bibliography in the individual bibliography allows the use of the AGRO database for calculating the citation index of scientific journals, *i.e.* determining the number of citations for the Polish Journal of Science and Technology (POL-index) citation index, according to subsequent communications of the Minister of Science and Higher Education of September 17, 2012 and May 29, 2013 on the criteria and procedure for the evaluation of scientific journals [4].

Owing to the subsidy for the database in 2009–2015, the development of the AGRO database was possible in several respects. Contracts were made with publishers of magazines and full texts of articles started to be placed in the records. The AGRO database was expanded with 314,869 new records, and the number of indexed journals increased by 172 new titles. All affiliated authors were added, not as the first author, as was done earlier. We made the submission of abstracts and attachment bibliographies in as many records as possible. The Digital Object Identifier (DOI) was included in the article. Keywords translated from Polish into English were included in many existing and newly created Polish AGRO records. New elements of the graphic design were introduced, including the appearance (colors, decorative elements and placement of items, database logotype) using the new web page interface.

The completeness and high quality of metadata and domain metadata of the AGRO database are an important factor in building a citation index and prevent the need of multiple data entry. The AGRO index indexes 1060 journal titles that cover a spectrum of Polish scientific journals from natural sciences and agricultural sciences.

Due to the lack of a competitive AGRO base (focusing on natural and agricultural and related sciences), the resources represented [5] in the AGRO database are unique within the meaning of the metadata focus on the ICM University Library's Library. The scientific resources provided in the AGRO database contribute to the enhancement of the evaluation capacity of scientific workers, as well as Polish universities and research institutes, by using AGRO metadata in the POL-on system. They allow creation of scientific, research and

developmental works in the fields of natural sciences and agriculture. Most of the scientific resources provided in the AGRO database are innovative and thus contribute to the development of research and development, particularly in the areas of science recognized as particularly important, in the field of biotechnology (e.g. *Journal of Plant Protection Research, Biotechnology and Biotechnology, Biotechnology and Biotechnology*), medicine and pharmacology (e.g. *Journal of Physiology and Pharmacology*), technology and engineering (e.g. *Engineering Science and Technology*), agriculture (e.g. *Advances in Agricultural Knowledge, Advances in Agricultural Sciences*). All AGRO records (units) are interpreted as learning resources because they cover not only academic publications, but also bibliographic descriptions of research results and studies drawn up in accordance with the applicable standards and scientific methodology of the bibliography. AGRO is a digital learning resource. It is associated with broadly understood natural sciences and agricultural sciences. The resource is created according to the methodology of bibliography, which is one of the fields of science [6]. All metadata contained in the database of scientific publications, research results, research data and scientific papers serve to identify the source documents on which further scientific research is conducted. Supplementary metadata are articles from journals in the PDF format.

### 3. Types of records in the AGRO database

The AGRO database contains 3 types of records:

- records containing a bibliographic description of the indexed articles, including abstracts, attached bibliography and full text of the article;
- records containing a bibliographic description of the indexed articles along with abstracts and bibliography attached;
- records containing a bibliographic description of the indexed articles.

These three types of AGRO records, including third-party records, i.e. metadata in principle, are always an integral part of the indexed article, so that it is easily identifiable and therefore a source of development and research.

Some articles can be downloaded electronically from the database, some contain only metadata in the database, and full texts are available in the paper library only. It is possible to send, at the user's request, a scan of the paper version of the magazine. The AGRO database is created in DeskLight and made available through the YADDA software on the Library of Science ICM platform of the University of Warsaw. Access to the database metadata is open on an "open access" basis. Database records are published online – digital forms of data and content are visible to users immediately after opening the home page of the database. Full-text downloads are not required for specialized software on the user's side.

Articles that are not in the database in the form of full texts should be ordered in the library and after completion of the orders in the library's warehouse by the storehouse, they can be made available to the orderer only in the library's

library on the spot. Magazines cannot be taken home, they can be read in the reading room. The reader finds articles on the subject at home or on the Library computers. Then, he or she must come to the Library and order the magazines (yearbooks, volumes, numbers where the articles are searched).

#### 4. AGRO database users

AGRO recipients have been defined and divided into the following groups:

- the Polish academic community (academic and teaching staff, students, university library staff, especially staff of scientific information units);
- the international academic community (academic and teaching staff, students, university library staff, information science staff in particular);
- students of general secondary schools, technical and vocational schools, Polish and foreign;
- the community of Polish and foreign research institutes;
- researchers, specialists (*e.g.* engineers, food technologists, bibliophiles, librarians, archivists, science historians), scientific laboratories, R&D personnel, working individually or in research teams;
- R&D enterprises;
- employees of the Polish Academy of Sciences;
- publishers;
- agricultural advisory centers in Poland;
- owners and employees of agricultural holdings, farming and horticulture, horticulture, animal husbandry, plant protection, etc. and agritourism farms;
- managers and employees of all agro-food industries, feed industry, HoReCa sector (hospitality, restaurants, catering);
- management staff and employees of the State Forests Enterprise and forestry experimenters;
- management and staff of the wood and refrigeration industry;
- veterinarians, medicine and other health professionals, nutritionists in particular;
- the global virtual community (a group of Internet users interested in accessing scientific literature), hobbyists, and households.

the database users and their information and search preferences were determined based on surveys.

As a result of the analysis of target groups, the following problems and social needs were identified:

- each target group has the need to access scientific and agricultural sciences and related sciences in order to: create scientific, research, research and development works by students and researchers, conduct research in various scientific areas, obtain the necessary information. These affect the running of a farm and introducing innovative techniques. New research results, published in accessible articles, can be used by owners of farms for their modernization, i.e. using the

methods described in the articles), extension of knowledge in agriculture, pharmacy, food service, veterinary medicine, etc.; access to science resources also to students and foreign scientists; increased competitiveness and innovativeness of farms by accessing a broader database that can be used for day-to-day operations, increasing the competitiveness and innovation of enterprises, and thus the country – the industry uses the published results to develop new solutions for its business; the development of Polish forestry;

- the availability of scientific resources for machine read and automatic retrieval, no software requirements – the database is available through any web browser on all computers; Adobe Reader (pdf) only is required to read a full text;
- protection of personal data – all the groups surveyed identified the need for free access to the resources without having to register and log in; this is due to the need to protect the privacy and the reluctance to share personal data, and because of the time of using the database necessary to register, if it is needed to set up a database and log in later (no need to register and log in shortens the working time);
- time saving – fast and free access to articles with full text in the AGRO database, without having to: go to the library, register and log in to the database, etc.;
- free access to the resources from anywhere in the world – the target groups are located not only in Poland but around the world; thanks to the availability of the database via the Internet, Polish students and researchers abroad and international academic and scientific communities can use the database;
- free access to the resources at any time – the target groups, especially students and researchers, demand constant access to scientific resources as their working hours vary (work at night, use of resources while in another time zone, etc.);
- supplementing scientific resources with metadata – in accordance with the information obtained from publishers, the need for using ready-made metadata packets sent in the XML format has been identified for use in the POL-index;
- a precise search engine in the AGRO database – search options extension;
- the use of interoperability and availability standards, expansion of the database availability by adapting to WCAG 2.0 to a level that exceeds AA;
- a more transparent and functional mobile layout – there is a need to increase the functionality of the modern channels.

## **5. Use of the AGRO database in Poland and abroad – statistical data**

In 2016 a detailed analysis of AGRO users was conducted.

1. The number of AGRO database users: 390,378, including those entering through:
  - directly from the search engines and scholar.google.com: 257,000
  - bg.up.poznan.pl: 6,417
  - bu.uwm.edu.pl: 3,286

- www.bg.sggw.pl: 5,109
- library.ur.krakow.pl: 2,160
- up-hip.pfsl.poznan.pl: 2,107
- bg.up.lublin.pl: 1,908
- www.bg.ar.lublin.pl: 1,793
- www.facebook.com: 1,202

2. Actions taken (open links, downloaded files): 1,478,000

3. Number of visits: 8,180,382; Hits: 180,497

**Table 1.** Origin of AGRO users by continent; source: Interdisciplinary Center for Mathematical and Computer Modeling at the University of Warsaw (ICM)

Continent	Share [%]	Users
Europe	88.4	290,947
Asia	8.4	26,837
North America	1.8	5,789
South America	0.5	1,676
Africa	0.5	1,505
Oceania	0.2	722

**Table 2.** Origin of AGRO database users by country; source: Interdisciplinary Center for Mathematical and Computer Modeling at the University of Warsaw (ICM)

Country	Share [%]	Users
Poland	83.4	2650,224
China	6.2	19,792
United States	1.4	4,528
Great Britain	0.8	2,405
Germany	0.7	2,108

**Table 3.** Origin of AGRO users by region; source: Interdisciplinary Center for Mathematical and Computer Modeling at the University of Warsaw (ICM)

Region	Share [%]	Users
unknown	30	95,220
Mazowieckie	14.7	46,815
Wielkopolskie	7.6	24,011
Beijing, China	5.8	18,468
Małopolskie	5.2	16,624
Kujawsko-pomorskie	4.7	14,865
Dolnośląskie	4.2	13,368
Śląskie	4	12,667

## 6. AGRO database development plans for 2016–2020

By 2020 the AGRO database will intend to digitize 31 titles (2,514) of issues or volumes, 47,444 articles, 417,080 pages, including 5,924 pages with graphics) of Polish scientific journals (objects planned for digitization will in no way be digitally distributed on any platform). Digitization will include resources from 1 issue of journals from the fields of natural sciences, agriculture and related sciences and the placement of full texts of articles in the database. It is planned to widen the base by 151,015 records. In addition, the full text of articles from 88 journal titles will be added to the database with publishers from whom full-text contracts have already been signed, and 15 titles whose publishers have already agreed to conclude contracts. All journals indexed in the database will be updated with new bibliographic descriptions beginning as of 2016, as new numbers or volumes appear. It is planned to extend the chronological coverage of 58 journals, which have been indexed in the database since 1992, by indexing the articles contained in earlier years, starting with the first issue or volume of each of those journals. As a result of these efforts, a significant quantitative increase will be made in the integrated platform of the digital AGRO resources available to support research and development. It will allow researchers, students and all target group users to quickly, easily and conveniently access source materials and scientific publications. It will optimize the development of the Polish digital content on the Internet being important and significant resources for the development of the Polish science, economy and entrepreneurship.

The planned development of the database is as follows:

- overall increase in the number of records by another 151,015 items;
- digitization – 47,444 articles / 31,581 records – all with full text;
- further development of full-text resources – 16,270 records;
- extending the chronological range – archival resources – 36,852 records;
- widening the chronological range – resources of the latest 66,312 records.

In addition, the developers intend to expand the range of web-based technologies and devices. The page style (menu, layout, item size) will be adapted to be displayed on different devices, including mobile ones. The implementation of the planned projects will be possible after receiving the funding for the maintenance and development of AGRO. Accordingly, on May 31, 2017 the Main Library of the University of Life Sciences in Poznań submitted a project entitled *Digital distribution of resources of Polish journals from natural sciences and agricultural sciences in the AGRO database* in the Competition of the Center of Projects Poland Digital – Administration and Open Government, 2.3 Digital Accessibility and Usefulness of Public Sector Information, 2.3.1 Digital Public Access to Public Information from Administrative and Science Resources.



## 7. Conclusions

The AGRO database is a comprehensive source of information on natural sciences, agricultural and related sciences. By making the database accessible to the users, it is possible to use the existing research results or analyses for development work, economic development, resulting from the development of transfer of knowledge between scientific units and enterprises, the importance of the Polish science on the international arena through international exchange of information, establishment of international cooperation between learning units and between foreign entrepreneurs and scientific units. It is possible to build a more friendly relationship between the state and citizens through the implementation of the “open government” concept, providing free access to the public sector information and improving the quality of education (secondary and tertiary education) as well as increasing the education of academics and students as well as staff of business organizations, and thus increase their chances in the labor market. By providing the information contained in the AGRO database, specifically the knowledge resources such as articles from agricultural journals, we contribute to the growth of innovation and competitiveness of the Polish agriculture, and thus, to the development of agricultural holdings and an increase in the plant and animal production. Thus, the database contributes to equal opportunities for access to the knowledge of target groups of users, especially those engaged in farming, enabling them to use the acquired knowledge to develop their farms and increase their competitiveness, both in the domestic market and in foreign markets. Equal opportunities for access to the knowledge of people residing in areas with limited access to academic centers can be made available, increasing their chances in the labor market.

Sharing the metadata and data contained in the database also increases the competitiveness and innovation of companies operating in different industries and thus the country’s economy by applying the published industry research results in their activities in practice or using the published results to create new solutions for this activity.

## References

- [1] *The AGRO database* [Online] available at: <http://agro.icm.edu.pl/agro/search/article.action?cid=1fb619c0-4319-4ba5-aff2-1dfbeb21802f> (Accessed: 31.05.2017)
- [2] Polarczyk M, Kasprzak Z 2013 *The AGRO database implemented in the project: Development and transformation of the AGRO bibliographic database into a bibliographic and abstract database using the YADDA software*, [in:] Sučasni problemi diāl'nosti biblioteki v umovah informacijnogo suspil'stva: Materiali p'ätoï mizhnarodnoï naukovo-praktičnoï konferencii, Vidavnicтво L'vivs'koï politehniki
- [3] Kasprzak Z, Polarczyk M 2013 *New elements in the AGRO database development, EBIB conference materials*, [in:] Bibliographic databases and their role in the development of science. 2nd Scientific Conference of the BazTech Consortium [Online] available at: [http://open.ebib.pl/ojs/index.php/Mat\\_konf/article/view/32](http://open.ebib.pl/ojs/index.php/Mat_konf/article/view/32) 24 (Accessed: 08.07.2014)

- [4] Kasprzak Z, Polarczyk M, Gmerek K *Project The adaptation of AGRO metadata to the Polish Scientific Bibliography and POL-index – intensification of information and functional advantages AGRO database*, [in:] J. Intern. Sci. Publ., Educ. Altern. [Online] available at: <https://www.scientific-publications.net/bg/article/1000942/>
- [5] Pacek J 2010 *Bibliography in a changing information environment*, SBP
- [6] Pacek J 2009 *Issue of bibliography in the perspective of the development of information technologies*, [in:] Bibliography. Theory, practice, didactics Woźniak-Kasperek J, Ochmański M (ed.)