

Historical overview and perspectives of the Instituto de Biología Agrícola de Mendoza (IBAM): since its birth in 2009 to 2019

Revisión histórica y perspectivas del Instituto de Biología Agrícola de Mendoza (IBAM): desde su creación en 2009 hasta el 2019

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ABSTRACT

The Instituto de Biología Agrícola de Mendoza (IBAM) belongs to the Universidad Nacional de Cuyo and CONICET. It has the mission of generating knowledge in basic aspects and applied to irrigated agriculture. The purpose of this review is to analyze the articles published during 10 years, since its creation. All publications were collected from 2009 to the present and the outcoming data was evaluated according to funding, collaborations, disciplines, equipment, journal quality indicators and IBAM's h-index. Taking the Scimago ranking into account, it was concluded that 58% of the publications are in quartile 1 (Q1). When the disciplines were analyzed, those related to the crops of the Mendoza region, such as vine, potato, garlic and olive, were the most studied. Most of the projects that finance publications come from national institutions. Interinstitutional collaborations are mainly with national entities. IBAM has been growing over the past 10 years in terms of human resources and in the quality of its research.

Keywords

publication analysis • IBAM staff • CONICET • Universidad Nacional de Cuyo • Q-index • equipment • research funding • institutional collaborations • publications topic • H-index

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RESUMEN

El Instituto de Biología Agrícola de Mendoza (IBAM) tiene la misión de generar conocimientos en aspectos básicos y aplicados a la agricultura de regadío y pertenece a la Universidad Nacional de Cuyo y al CONICET. El objetivo de este trabajo es analizar los artículos publicados en los 10 años desde la creación del Instituto. Para ello se recopilaron todas las publicaciones desde el 2009 a la actualidad y se trabajó con los datos que se desprendieron de los mismos, como el financiamiento, las colaboraciones, las disciplinas, el equipamiento, los indicadores de calidad de las revistas y el índice h del IBAM. Teniendo en cuenta el ranking de Scimago, se concluyó que el 58% de las publicaciones se encuentran en el cuartil 1 (Q1). En cuanto a las disciplinas, donde hubo más producción fueron las relacionadas con los cultivos de la región de Mendoza, como por ejemplo la vid, papa, ajo y olivo entre otras. El 94% del financiamiento para las publicaciones proviene de instituciones nacionales. Las colaboraciones interinstitucionales son principalmente con entes nacionales. El IBAM ha ido creciendo a lo largo de los 10 años en cuanto a recursos humanos como en la calidad de sus investigaciones.

Palabras clave

análisis de publicaciones • recursos humanos de IBAM • CONICET • Universidad Nacional de Cuyo • índice Q • equipamiento • financiamiento para investigación • colaboraciones institucionales • temas de publicación • índice H

INTRODUCTION

The Instituto de Biología Agrícola de Mendoza (IBAM) was created in October of 2009, as a need of many researchers that worked in several research groups and Laboratories of the Facultad de Ciencias Agrarias, Universidad Nacional de Cuyo, Mendoza, Argentina. The Institute belongs to the Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) and Universidad Nacional de Cuyo (UNCuyo) and is located within the campus of the Facultad de Ciencias Agrarias (FCA, UNCuyo).

IBAM is constituted by ten research groups, working on different areas such as molecular biology and genetics, analytical and biological chemistry, plant physiology, and plant pathology. A total of 59 members were part of IBAM in 2018, including 26 researchers, 28 PhD students and postdoctoral fellows, one administrative secretary, and four research support staff (CPA).

The main purpose of IBAM is to generate knowledge in basic and applied aspects of irrigated agriculture, developing tools that improve production and reduce the negative factors on crops and the environment. IBAM's researchers conduct different projects in the areas described above, and the results of their studies are shared with the scientific community through publications in high standard national and international journals. Also, the researches contribute to solving regional community problems through the generation of technical services like DNA and metabolomics analysis.

This work presents an overview of the scientific production of IBAM during its first 10 years by collecting data of the research topics, funding, relationships with other institutions, h-index, equipment used, among others.

To the best of our knowledge, there are no reports of publication analysis of other CONICET Institutes. However, there are articles that analyse the bibliometric data of FCA, UNCuyo projects (3), and argentinian Agriculture Multidisciplinary publications (4).

MATERIALS AND METHODS

All publications from the period 2009-2018 involving a member of IBAM were evaluated (Supplementary Table). The data collection included year of publication, authors, total number of citations, equipment used, Journal Quality index, funding sources, number of PhD graduates, main research topics, collaborations between IBAM and other governmental or private institutes inside Argentina or international.

The authors of the publications were classified in terms of researchers, PhD students, post-doctoral fellows, or research support staff. The total number of citations was extracted from the database Scopus (6). For assessing the equipment used, only those belonging to IBAM were considered. The journal quality was assessed by the indicators developed by Scimago Journal Rank (SJR) (5), ranging from Q1 to Q4 (1) and according to the discipline of each research. The funding information supporting the published research was taken from the publications. The main research topics were established through the analysis of the key words. All collaborations with other institutions were identified from the affiliation data of the authors.

RESULTS AND DISCUSSION

Publications along a 10-year period

Considering the Scopus database, the number of publications during the 10 years since the creation of IBAM, reached a total of 186 scientific articles (figure 1). Interestingly, the number of annual publications increased since 2009, with a minimum of 9 publications and a maximum of 33 in 2018. The relationship between the number of articles/researcher/year varied from 0.73 in 2010 to 1.4 in 2014. This ratio in 2014 was due to an exceptional number of publications made, and not for a decrease of researchers. The number of publications per year reflects the continuous strengthening of IBAM's staff, including PhD students and researchers.

IBAM staff

During the first years of IBAM, the staff increased significantly, in particular from 2010 to 2013 (figure 2, page 412). In the following years, the number of members of the institute was constant, with a slowly but steady increase in the number of researchers. The main reason of that increase is that once a PhD student graduates, they can apply to be a researcher at IBAM following an intensive and competitive evaluation. An alternative, for the recent PhDs, is to apply for jobs in the private sector or public institutions like UNCuyo.

The research support staff (CPA, Carrera del Personal de Apoyo a la Investigación y Desarrollo) are professionals with different expertise and academic formation that collaborate with researchers and PhD students or postdoctoral fellows. In this context, they plan, carry out and execute technical support work, according to the requirements of the researchers. As shown in figure 2 (page 412), the CPA staff grew in the first years, but has remained constant since 2012 with four professional members.

A remarkable aspect to highlight about IBAM's researchers is that 81% of them are also professors at UNCuyo, giving them the opportunity to share their experiences and knowledge with students.

The red line shows the ratio of publications/year/researcher.

La línea roja muestra la relación entre las publicaciones anuales por investigador.

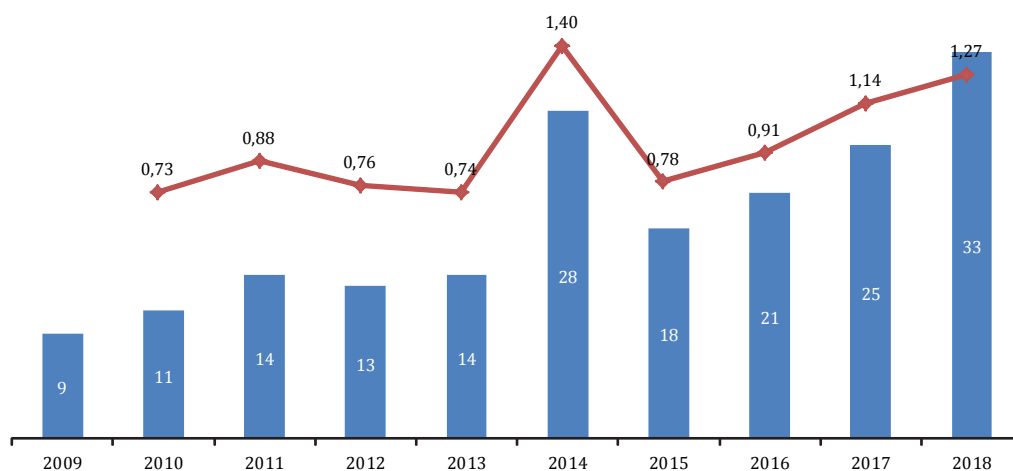


Figure 1. The number of publications per year are represented in blue bars.

Figura 1. Las publicaciones de cada año están representadas en barras azules.

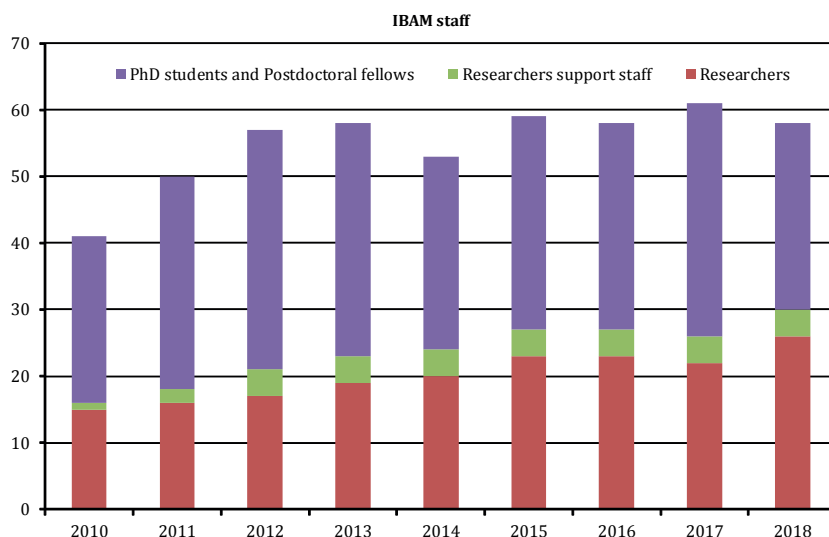


Figure 2. Total IBAM staff is represented in bars. Researchers are coloured in red, research support staff in green and PhD students in blue.

Figura 2. El personal del IBAM está representado en barras: los investigadores en rojo, los CPA en verde y los becarios en azul.

Journal quality indicators

With the aim to assess the journal quality, the Q index established by SJR was used. This index considers the importance of journals per research area, based principally on the number of citations. As can be seen in figure 3, most of the publications are placed in journals within the top category, Q1, showing that the majority of IBAM’s scientific articles are of the highest quality worldwide.

It is important to highlight that even though IBAM is one of the smallest Institutes in CONICET Mendoza and has a very short history, it could be recognized as one of the most outstanding centres of investigation in agricultural issues.

SCIMAGORANKING

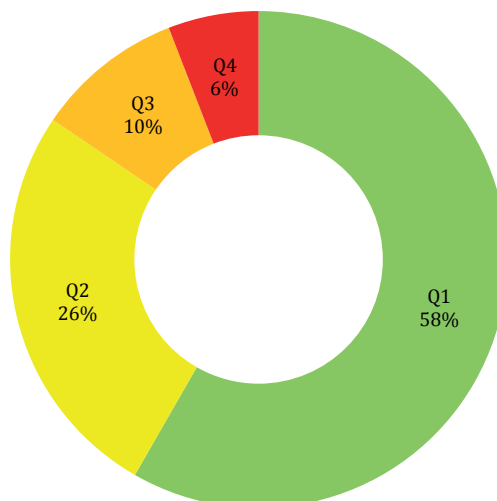


Figure 3. Total IBAM publications grouped according to SCIMAGO ranking.

Figura 3. El total de las publicaciones del IBAM se representan agrupadas de acuerdo con el ranking de SCIMAGO.

Research funding

Considering financial support, all the investigations that were published were supported by diverse funding agencies. Even though the funding source was included in the publications, the funding amounts were not detailed. Published research at IBAM received funding from national (94%) and international (6%) sources (figure 4A).

The national funding was provided by UNCuyo, Agencia Nacional de Promoción Científica y Tecnológica, and CONICET (figure 4B). The double affiliation of IBAM is coherent with the fact that large part of the funding comes from UNCuyo and CONICET. Although in figure 4 the private sector financing (*Companies*) seems to be poor, it does not reflect the real situation: there is a continuous and substantial collaboration of this sector with IBAM, but it is not represented in the information given in the articles published. Actually several authors, mainly doctoral and postdoctoral students have been awarded fellowships in a cofounding format with the productive sector. Furthermore, much experimental work has been carried out in private locations.

Institutional collaborations

With the aim to identify the Institutional relationships between researchers from different organizations, author affiliations were considered.

As mentioned above, IBAM is organized in different research groups, focusing on several areas. However, as shown in figure 5 (page 414), there is a continuous interaction among research groups evidenced by joint publications (9.2%, shown as IBAM-IBAM). Interestingly, there is a considerable commitment between IBAM and FCA researchers (14.6%), working side by side and exploiting the potential of the agricultural area.

Moreover, IBAM researchers also collaborate with international research groups (21.8%) mainly from Spain, USA, and France. These interactions reflect the global recognition of IBAM.

Furthermore, IBAM researchers interact with other national institutions (52.9%), principally with INTA (Instituto Nacional de Tecnología Agropecuaria), and several other national universities such as Universidad Nacional de San Luis and Universidad de Buenos Aires. Finally, it is very important the collaborative work with other institutes from CONICET Mendoza, such as IMBECU and IANIGLA.

Taking into account the relationship of IBAM and private companies, only Catena Zapata Institute appears on publications, even though other agreements have been established between IBAM and private companies.

Also it is important to highlight that more than 20% of the collaborations are with international institutions.

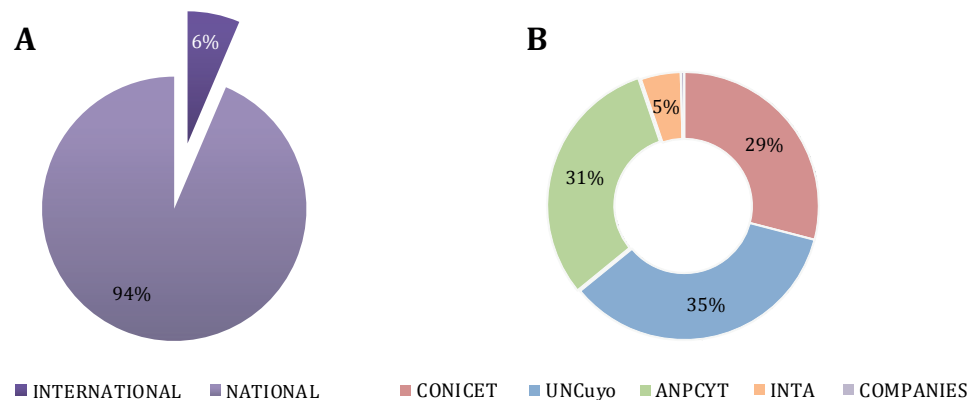


Figure 4. A, funding declared in publications according to national and international contribution based on the number of projects financed. B, national funding was split according to the Institution that financed the research.

Figura 4. A, Financiamiento declarado en las publicaciones de acuerdo con subsidios nacionales e internacionales, basado en el número de proyectos. B, el financiamiento nacional sectorizado en las distintas instituciones que contribuyeron a las publicaciones.



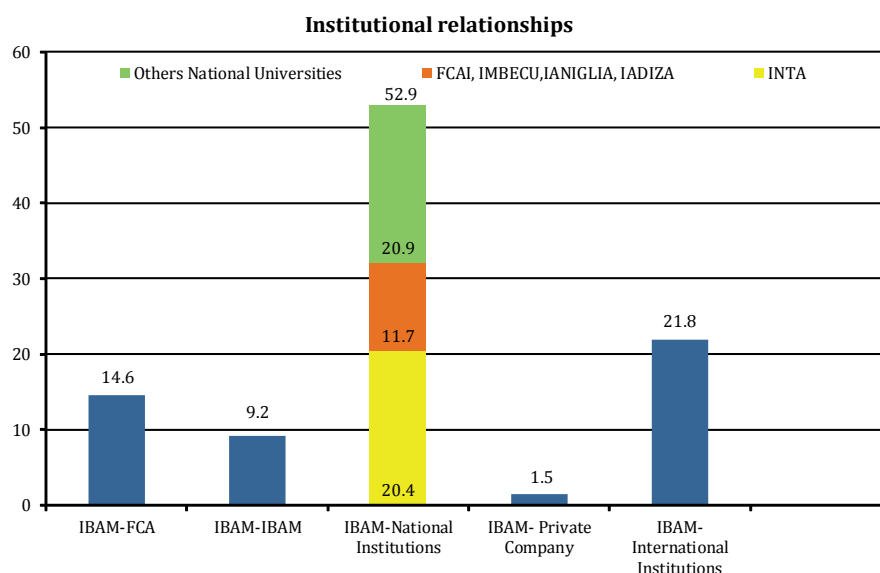


Figure 5. Institutional relationships between IBAM and several institutions.
Figura 5. Relaciones institucionales entre los integrantes del IBAM y otras instituciones.

Equipment used

Several complex equipment, located at IBAM, are shared among IBAM researchers and are available for investigations performed in FCA. They were acquired through different financing projects, as those mentioned above.

The equipment declared in publications is presented in figure 6. Among them, high performance liquid chromatography (HPLC) was the most used (26.7%), followed by gas chromatography (17.2%), thermocyclers (16.4%) and spectrophotometers (12.1%). These data is in agreement with the main research areas of IBAM, analytical chemistry and plant genetics. It important to highlight that one of the institutional priorities is the constant modernization of its equipment, as a way to be competitive worldwide.

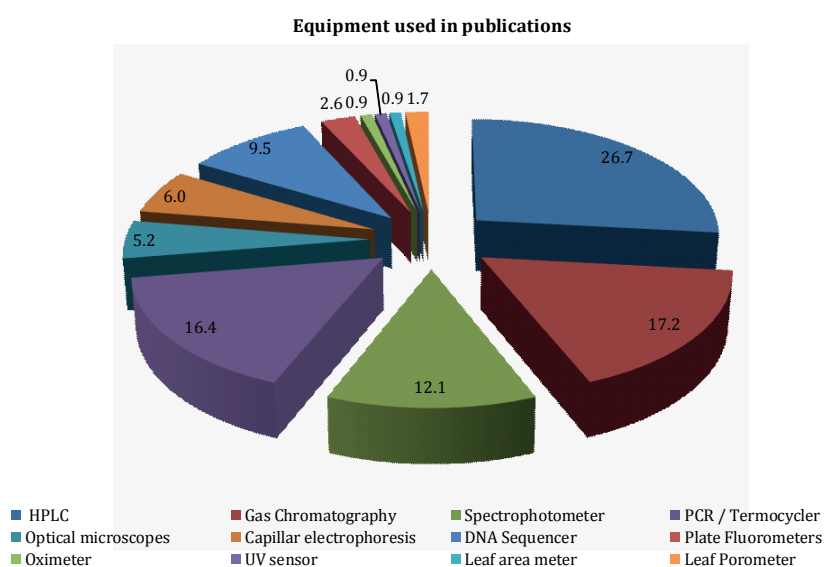


Figure 6. Equipment used in publications represented in percentage.
Figura 6. Equipamiento utilizado en las publicaciones.

Publication topics

IBAM is a multidisciplinary Institute that focuses on a variety of research areas. The key words from all the publications were classified in two areas: crop studies (77%) and other topics (23%) such as analytical chemistry, microbiology and evolution (figure 7A). Among the crop-related articles, grapevine studies were the most numerous, followed by potato, garlic, and olive (figure 7B). This distribution is in accordance with the productive interests of the Cuyo region, showing the commitment of IBAM to the local development. In addition, it is important to highlight the valuable studies conducted with non-cultivated plants. These species allow the study and discovery of basic biological mechanisms, vital for basic research.

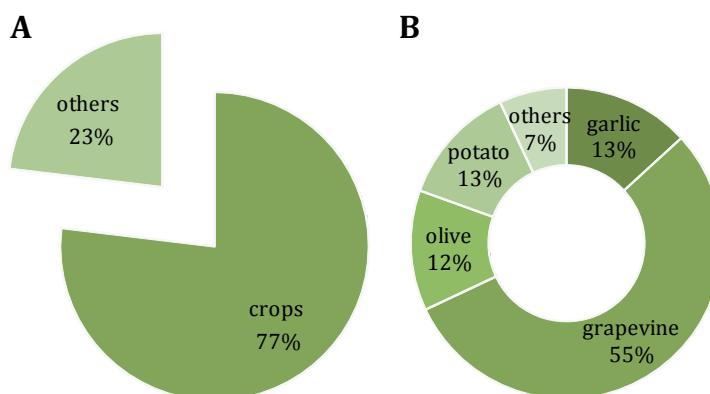


Figure 7. A, Publication topics classified as crop or others (analytical chemistry, microbiology and evolution). B, Crops publications divided into the different farming vegetables studied.

Figura 7. A, La temática de las publicaciones clasificadas de acuerdo con cultivos y otros (química analítica, microbiología y evolución). B, las publicaciones referidas a cultivos se dividieron en diferentes áreas estudiadas.

When analysing grapevine studies, the investigations include the determination of different metabolites, genetic and epigenetic studies, effects of different light quality and altitudes on plant physiology, among others. It is important to highlight that grapevine is object of interest from the vineyard, through the winemaking process and finishing with the alternative use of wine residues for biotechnology purpose. In the vineyard, IBAM conducts several studies of genetic and environmental effects on grape quality, as well as grape interaction with pathogens and plagues. The winemaking process is investigated and controlled by determining different secondary metabolites in wine, following different analytical methods. In addition, wine is tasted by specialists with the purpose of achieving a complete characterization. Ultimately, the vinification process generates great quantities of grape pomace. In this sense, IBAM studies are focused on its reutilization, as a sustainable source of bioactive compounds.

IBAM's h-index

The h-index is an indicator of the number of publications and citations of a single researcher or from an Institution (2). The IBAM h-index was 28 (figure 8, page 416), indicating the good quality of the scientific production during the 10 years of its existence.



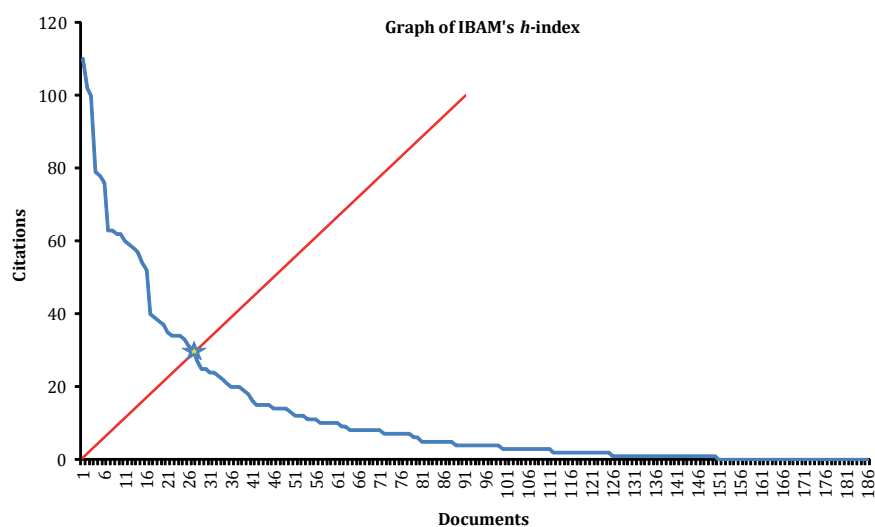


Figure 8. The intersection of the 45 degree line with the curve giving the number of citations *versus* the paper number gives *h*. The total number of citations is the area under the curve.

Figura 8. Índice *h* del IBAM: la intersección de la línea a 45 grados con la curva, resultante del número de citaciones, con respecto al número de publicaciones da como resultado el valor *h*. El número total de citas es el área debajo de la curva.

IBAM and the society

IBAM promotes an active policy of knowledge transfer to different sectors of society. Through services, agreements, and consultancies, the Institute makes all its research expertise and development experience available, responding to the concerns raised by public and private entities that seek to solve problems related to regional agricultural activity. Currently, 17 high-level technological services (STANs) are active. The equipment, infrastructure, and specialized human resources of the Centres, Institutes and Laboratories related to it are generally used for its provision.

More information in: <https://www.mendoza.conicet.gov.ar/portal/ibam/paginas/index/servicios97>

SUPPLEMENTARY MATERIALS

Supplementary materials with this article can be found, in the online version, at:

<https://drive.google.com/file/d/13f8fzXaXpaeGDP-IefGyznWHUVuKvDb/view?usp=sharing>

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