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BIBLIOMETRIC EVALUATION OF BIBLIOGRAPHIC DATA IN DOCUMENTS
PUBLISHED IN SLOVENIA BETWEEN 1994-2000**

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ABSTRACT

768 documents related to plant and crop science, production and protection among 2844 documents (D) published in Slovenia in the period 1994-2000 and indexed by the Slovenian Agris Center for inclusion in Agris database were assessed with regard to bibliographic elements. Yearly occurrences differed highly due to intensive production of proceedings papers in certain years. 60% of D were published in Slovenian and 36% in English. There were 850 different authors. 18 authors published more than 10 D. 590 authors published only one D. 4 D were written by 11 or more co-authors, and 317 D by one author. Slovenians accounted for majority of authors as expected. Croatia, Germany, Hungary, Italy, India accounted for 45, 23, 20, 18, 17 respective units. Contributors originated in 36 countries. Among the Slovenian university-affiliated contributors majority were affiliated to the Biotechnical Faculty (Agronomy Dept.). 356 D were published as journal articles, and 404 as papers in proceedings. The selection of 768 records was strongly influenced by existing Agris classification scheme. We included most D related to various aspects of crop- or plant-production, physiology, and protection, including forest trees. We had to exclude many food and feed-related D, as these categories don't differentiate between plant- or crop-related and animal-related topics. However, the existing schemes use the same criteria for different (sub)disciplines, such as animal and plant science, forestry, food and feed science, so they may to certain extent be used as an appropriate tool to compare the above (sub)disciplines.

Key words: agriculture, agronomy, data collection, data analysis, databases, diffusion of information, documentation, information processing, information science, plant sciences, publications, research evaluation

Additional keywords:

scientometrics, bibliometrics, scientometric analysis, bibliometric analysis, scientific information, synonyms, bibliographic data, publishing, national journals, bibliographies, data bases, indexing, classification, Slovenia

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IZVLEČEK (Slovenian)

ZNANOST O RASTLINAH, PROIZVODNJA IN VARSTVO RASTLIN: BIBLIOMETRIČNO VREDNOTENJE BIBLIOGRAFSKIH PODATKOV V DOKUMENTIH, OBJAVLJENIH V SLOVENIJI V OBDOBJU 1994-2000

Med 2844 dokumeni (D), objavljenimi v Sloveniji v obdobju 1994-2000, in ki jih je za vnos v zbirko Agris indeksiral slovenski center Agris, smo ovrednotili bibliografske elemente v 768 dokumentih v povezavi z znanostjo o rastlinah ter proizvodnjo in varstvom rastlin. Letno število D niha zaradi velikega števila zbornikov s posvetovanj v posameznih letih. 60% D je bilo tiskanih v slovenščini in 36% v angleščini. Skupaj je bilo 850 avtorjev. 18 jih je objavilo več kot 10 dokumentov vsak, 590 pa le en dokument. 4 D so imeli 11 ali več soavtorjev, 317 pa le enega. Največ avtorjev je bilo iz Slovenije, gre namreč za nacionalni vnos. Med tujimi avtorji jih je bilo največ iz Hrvaške, Nemčije, Madžarske, Italije in Indije s po 45, 23, 20, 18 in 17 enotami. Vseh držav je bilo 36. Med domačimi univerzitetnimi inštitucijami so prevladovali avtorji z Biotehniške fakultete (Odd. za agronomijo). 356 D je bilo člankov v revijah, 404 pa prispevkov s posvetovanj. Na izbor 768 D je močno vplivala obstoječa klasifikacijska shema sistema Agris. V raziskavo je bila vključena večina rastlinske proizvodnje in varstva, vključno z gozdnim drevjem, izpustili pa smo nekatere D s področja živilstva in prehrane, saj Agris pri živilsko-prehranskih kategorijah ne loči med žvili živalskega in rastlinskega izvora. Ker pa zbirka Agris predvideva enaka načela za obdelavo različnih (pod)področij, kot so npr. agronomija, zootehnika, gozdarstvo, živilstvo, lahko rabi kot ustrezno sredstvo nadaljnje medsebojnega primerjanja teh (pod)področij.

Ključne besede: kmetijstvo, biotehnika, agronomija, zbiranje podatkov, analiza podatkov, podatkovne zbirke, razširjanje informacij, dokumentalistika, procesiranje informacij, znanstvena informatika, znanost o rastlinah, publikacije, vrednotenje raziskovanja

1 INTRODUCTION

This is the plant-and-crop-science-related part of a broader bibliographic analysis that focuses on general agricultural topics in Slovenian scientific and professional publications. In Slovenia every year several scientific and professional meetings are organized with national and international participation. The papers are regularly published as separate books of proceedings or as supplements to conventional serials. Several major national journals that cover most aspects of agricultural sciences are issued on monthly or quarterly basis. The objective of our examination is to assess this national input with regard to publications or parts of publications. We will try to identify most documents that have in the past few years addressed the topics of crop and plant sciences in a broader sense. We will measure the scatter of information according to some bibliometric principles. We will assess the documents with reference to principal bibliographic elements, such as authors, source, language, publication year, publication type, etc. In this way we seek to quantify Slovenian published production in a certain period and aggregate these data according to similar principles in order to offer a possibility of comparing different agricultural (sub)disciplines.

In the continuation we present some excerpts from recent scientometric contributions that address agriculture and some similar areas in the broad field of life sciences. We also review a few papers that relate directly to the bibliometrics of plant and crop sciences. We present mostly papers that focus on parameters such as countries or

geographical area, and on research based on particular journal or research topic. Hacker (1994) evaluated a bibliography of Peat and Peatland publications based on German language area in 1993. Nasir et al. (1994) investigated key agricultural journals in Malaysia in the period 1981-1990. Malaysian authors and yearly production were explored more thoroughly. Thomas (1996) investigated several databases such as Biological Abstracts, Agris, Current Advances in Biological Sciences, and Current Contents with regard to coverage of 360 Indian agricultural journals. Paredes and Portela (1997) analyzed research on garlic as published in Argentina, Brazil, Chile and Uruguay over the last 20 years with regard to areas of research and productivity of each particular country. Anduckia et al. (2000) bibliometrically evaluated research projects in Colombia between 1983 and 1994, including fields such as agricultural sciences and marine sciences. He used UNESCO classifications to categorize a particular field. He also assessed parameters such as institutions, mean number of authors of articles, and origin of publication. Jacobs and Ingwersen (2000) studied publication patterns and impact of South African scientists during the 1981-96 period, with special emphasis on the period of 1992-96. They surveyed plant and animal sciences, biochemistry and microbiology along with physics and chemistry. A rather interesting approach based on religious affiliation of a country was taken by Shaheen (2001) who investigated a use of Agris database by 10 Muslim countries with a view to encourage better documenting of indigenous agricultural literature. Erfteimeijer et al. (2001) used several major databases such as Aquatic Sciences and Fisheries Abstracts, and Life Sciences Collection to investigate strengths and weaknesses in marine botanical research in the Western Indian Ocean published as non-conventional documents (gray literature) in the period 1950-2000.

Many authors investigated specific areas or individual agriculture-related journals, rather than general national output. Harper (1991) studied the Canadian Journal of Agricultural Economics to determine languages, references per article, authors and their respective affiliation. Nellessen and Fletcher (1993) assessed published literature, and 1400 different species of plants, as indexed in the UTAB database with regard to heavy metal uptake by plants. Majid (1995) assessed publishing patterns of agricultural research literature based on Pakistan Journal of Agricultural Research. Sharma (1995) identified graduate students as contributors in the journal Crop Science in the period 1961-94. Medicinal and aromatic plants literature, based on indexing by CAB Abstracts during 1973-93, was presented by Bhat (1995). Codron et al. (1995) also used CAB abstracts. They carried out a bibliometric analysis of international literature on fruit and vegetable economics during 1975-1989. Two Chinese journals *Scientia Silvae Sinicae* and *Scientia Agricultura Sinicae* were compared by Xu et al. (1996) with regard to articles published in 1993. Kristof (1997) inspected 5 core entomology journals with respect to errors in citations such as misspelling and errors in article titles, authors' names and pagination. Botello et al. (1998) estimated the total output of scientific papers on scrub during 1985-94. Among other data document types were assessed as well as authorship and languages. Meera (1998) described some characteristics of 222 plant ecology journals in the period 1994-1995. Place of publication, language and authors were identified along with main subject areas. Urushadze (1999) used journal *Pochvovedenie* to study soil science related topics in Georgia. General publishing trends in the soil literature output, based on Current Contents and Soils and Fertilizer databases were presented by Hartemink (1999).

Some exploration aiming at assessing national productivity was recently performed in many other life sciences disciplines. Aksnes et al. (2000) investigated performance of Norwegian scientists in the field of microbiology as covered by the database ISI/National Science Indicators on Diskette NSIOD. Arunachalam and Doss (2000) analyzed international collaboration in science, life sciences included, in 11 Asian countries as indexed by SCI in 1998. Indexing of Croatian medical journals and Croatian medical authors in international data bases was studied by Petrak (2001). Biomedical sciences-related nursing research in Spain was analyzed by Pardo et al. (2001).

Previously we also carried out a few similar analyses of national research performance. We investigated Slovenian documents covered by Agris database during 1975 and 1993 where we identified journals and other documents by the type of document (Bartol 1994). In 1995 (Bartol) we investigated broad subject areas such as plant, animal and food sciences in the Slovenian agricultural documents published in the years 1993 and 1994. We also assessed plant science documents with the use of descriptors assigned to Slovenian documents in the period 1993-1995 (Bartol, 1996)

2 MATERIAL AND METHODS

We employed international bibliographic database Agris to retrieve the Slovenian input in the database between 1994-2000. International information system for Agriculture AGRIS/WAICENT is constructed and maintained cooperatively by member countries of the FAO. The construction of the respective database is centrally coordinated by the FAO in Rome. The compilation of data is based on the principles of national input whereby each participating national centre inputs only those documents that had been issued in that particular country regardless of the affiliation of author. Among the authors under our investigation we therefore included all those foreign contributors who published their research in Slovenian publications. However, according to these precepts, the contributions by Slovenian authors which were published in foreign publications were not included in the analysis as the Slovenian National Agris Centre holds no control of this kind of input. Slovenian Centre carries out the input only for those documents that have been, if not written in English, supplied with an English language title and abstract.

We chose the period of 1994-2000 as Slovenia became an official member of Agris only in 1994. Input was initiated immediately so this period covers Slovenian national input fairly comprehensively. Slovenian Agris input consists only of those scientific or professional documents that have been complemented with an English (or other international language) title and abstract. We included all documents regardless of document type.

We investigated the following parameters:

- Year of publication
- Original language of text of the article, paper etc.
- Authors (authorship)
- Author's affiliation (name of institution)
- Source (title of journal, conference, publisher)
- Document or publication type (journal article, conference paper, monograph chapter/contribution etc.)

The parameters pertaining to the Source data on the database level are stored in different fields so some processing is needed if we want to extract all the information as to the publisher data. We present some possibilities of initial positioning of Source (journal/publisher) data in the original database according to the database fields:

Record 1: Journal article

SO (*source (bibliographic citation)*): Zbornik-Biotehnske-fakultete-Univerze-v-Ljubljani (Slovenia). Kmetijstvo. (1997). (no.69) p. 49-57.

Record 2: Conference contribution

CA (*corporate and conference author*): 4th Slovenian Conference on Plant Protection. Portoroz (Slovenia). 3-4 Mar 1999.

SO (*source (bibliographic citation)*): ... Plant Protection Society of Slovenia, Ljubljana (Slovenia). Lectures and Papers presented at 4th Slovenian Conference on Plant Protection. (Slovenia). 1999. 389-391.

Record 3: Monograph published in series

SO (*source (bibliographic citation)*): Ljubljana (Slovenia). Ljubljana Univ., Biotechnical Fac., Agronomy Dept., Agrarian Economics Inst. 1996. 186 p.

ST (*series/title information*): Studies on Agricultural Economics and Policy (Slovenia). no. 3.

Document 4: Conference contribution, Proceeding published in series

CA (*corporate and conference author*): 18th Food Technology Days ... 12-13 Jun 1997.

SO (*source (bibliographic citation)*): Ljubljana Univ. ... Modern processing technologies and food quality. Proceedings of thematic survey of topics ... 1997. p. 151-159.

ST (*series/title information*): Bitencevi zivilski dnevi (Slovenia). no. 18.

In the last example we can observe that sometimes as many as three different fields contain Source information.

Selection of plant related data

We chose broader Agris Categorization Scheme (Category Codes) to identify all existing broader subject areas (such as plant science, animal science, forestry, human nutrition etc.). In the Categorization Scheme there are 17 major subject categories and 115 sub-categories. In the Table 1 we present only the occurrences of a few selected principal categories without pertaining sub-categories.

Table 1: Occurrences of records classified with selected Agris Category Codes in the period 1994-2000

Category codes	Occ.	Category codes	Occ.
Soil science	77	Forestry	606
Human nutrition	105	<i>Plant science, production, protection</i>	768
Processing of agricultural products	569	Animal science, production, protection	790

Between 1994-2000 there were 2844 different records (occurrences). From the above records we then separated the plant and crop science, production and protection records (represented by categories F and H in the original database). In the Table 2 we show also occurrences of all plant- or crop-related sub-categories. Here we need to explain that the individual numbers in Tables 1 and 2 cannot be summarized because at least one, and up to three categories can be assigned to each particular document according to the Agris Categorization Scheme. The respective numbers of 2884 and 768 were therefore obtained with the use of Boolean OR.

We downloaded these records with the help of different downloading and field-defining options. We then organized the records as separate files according to the data we sought to analyze.

Table 2: Occurrences of plant- and crop-subcategories according to the Agris Categorization Scheme between 1994-2001

Category	Occ.	Category	Occ.
Crop-husbandry (F01)	101	Plant-physiology-and-biochemistry (F60)	84
Plant-propagation (F02)	31	Plant-physiology-Nutrition (F61)	7
Seed-production (F03)	12	Plant-phys. -Growth-and-development (F62)	58
Fertilizing (F04)	26	Plant-physiology-Reproduction (F63)	18
Irrigation (F06)	53	Plant-taxonomy-and-geography (F70)	102
Soil-cultivation (F07)	8	Protection-of-plants-General-aspects (H01)	24
Cropping-patterns-and-systems (F08)	4	Pests-of-plants (H10)	88
Plant-genetics-and-breeding (F30)	121	Plant-diseases (H20)	113
Plant-ecology (F40)	49	Miscellaneous-plant-disorders (H50)	31
Plant-structure (F50)	28	Weeds-and-weed-control (H60)	29

3 RESULTS

Among 2844 different records there were **768** records that were classified as pertaining to the subject of *plant sciences in general* (Table 1). Among those records there were 536 *Plant production* (F) records and 267 *Plant protection* (H) records. Again we need to clarify that, when combined with the Boolean OR, the occurrences of these two groups add up to 768 records as many documents could have been classified with both categories. In our text the terms *records* and *documents* are used almost synonymously. The term record represents a document that has been bibliographically indexed by a database.

Year of publication (PY)

We first examined Slovenian input with regard to the publication year. In the Table 3 we present number of records (occurrences) in each individual year under investigation. The results show significant contrasts between the respective years. This seeming anomaly will be explained in the discussion and is related to the publication patterns. Namely a single plant science-related workshop can in a particular year contribute 50 or more papers related to a specific subject such as plant protection.

Table 3: Occurrences of plant- and crop-sciences-related records in the period 1994-2000

PY	1994	1995	1996	1997	1998	1999	2000	Total
Occurrences	109	110	155	143	46	139	66	768

Original language of text (LA)

Next we examined the original language of text of articles, conference papers, monographs etc. (Figure 1). We can observe that some 60% of documents were written in Slovenian language and 36% in English. The number of other languages is low. These numbers represent documents that were issued in Slovenia in national journals and other publications. The policy of certain scientific journals is such to

encourage publication in an international language, preferably English. Proceedings papers are sometimes published also in other languages, however, the contributors generally have to provide an English-language abstract.

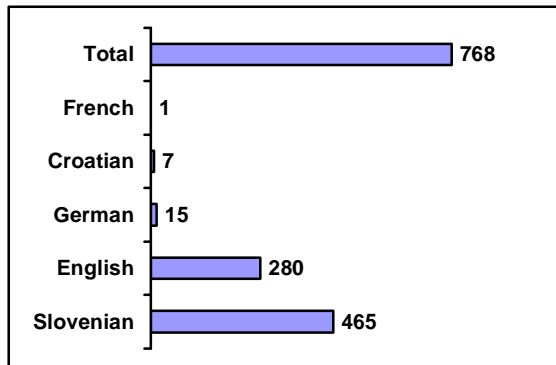


Figure 1: Occurrence of languages in crop- and plant sciences-related records in between 1994-2000

Authors of documents (AU)

With author data we sought to perform two different analyses. In the first analysis we identified all singular authors and the number of documents each author contributed to. We employed the method of Bradford bibliograph to present the number of contributions by each particular author. 850 different authors contributed to 768 different documents. If we consider each particular author-occurrence as a unit there were in all some 1661 author units (by 850 different authors), or slightly fewer than two contributions per author. However, when we examine this scatter more closely we realize that the scatter of contributions per author was far from uniform. A small minority of highly productive authors contributed a very high number of documents, whereas on the other hand, there were as many as 590 authors who contributed an only document in the entire period of 1994-2000 (Table 4, Figure 2).

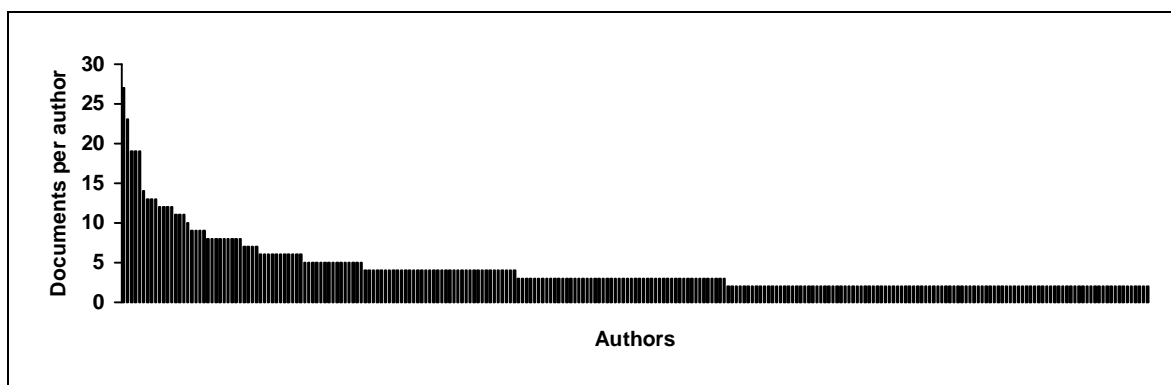


Figure 2: Number of crop- and plant sciences-related documents by respective authors between 1994-2000

Lotka's law of scientific productivity (1926), based on an inverse square law, states that in a certain field a very few highly productive authors will contribute a high

number of articles whereas on the other side approximately 60% of authors will contribute only one article. In our case there are among 853 contributors as many as 590 (69%) who contributed one document only. These is rather understandable as among the contributors there were many foreign guests at scientific meetings, symposia, etc.

Table 4: Number of crop- and plant sciences-related documents by respective authors between 1994-2000

Doc. per author	28	23	21	19	14	13	12	11	10	9	8	7	6	5	4	3	2	1
No. of authors	1	1	1	2	1	3	4	3	1	4	9	4	11	15	38	52	116	590

To complement these data we also analyzed the author output by the number of co-authors of a particular document. Earlier we established that there were some 850 different authors who contributed 768 documents. Those authors published their research as single or multiple contributors. In Table 5 we can observe that some documents were authored by as many as ten or even more contributors. On the other hand, 317 documents were authored by a single contributor. We can present the average number of contributors per article which is 1,95 but, as above, the average number is not indicative of the actual co-author distribution because it follows patterns that are very particular, as determined by Lotka.

Table 5: Number of contributors who (co)authored the respective crop- and plant sciences-related documents between 1994-2000

No. of co-authors	15	12	11	9	8	7	6	5	4	3	2	1
No. of documents	1	2	1	1	5	7	9	23	53	117	232	317

Address or affiliation of authors (AD)

After we had determined all respective authors or contributors of documents we further analyzed the affiliation or professional address of these authors. Again we used the available details in the original database. First we determined the country of residence of authors. However, the following data do not uniformly correspond with the number of authors or contributors as in the original database the data on individual authors are not uniformly supplied with the data on the country of origin. This piece of data is in the database given to an institution. For example, if there were three Italian contributors from the same institution in Italy this institution is presented in the field of Address (AD) only once along with the single occurrence of information for Italy as a country. On the other hand, if there were three Italian contributors from two different institutions in Italy then the Italy will acquire two occurrences as each particular institution is always supplied with an information on the pertaining country. Therefore the following data must be viewed with this information in mind. Because of this we do not summarize the occurrences but present them only by each particular country (Table 6). These occurrences should therefore serve only as an estimation of participating countries.

Table 6: Instances of author's country of affiliation as attributed to the crop- and plant sciences-related records in the address field between 1994-2000

Country	Occ.	Country	Occ.	Country	Occ.
(Slovenia)	782	(China)	9	(Australia)	1
(Croatia)	45	(Bulgaria)	5	(Bosnia and Herz.)	1
(Germany)	24	(France)	5	(Ethiopia)	1
(Hungary)	20	(Netherlands)	4	(Great Britain)	1
(Italy)	18	(Canada)	3	(Korea Republic)	1
(India)	17	(Egypt)	3	(Kyrgyzstan)	1
(Japan)	14	(Norway)	3	(Nepal)	1
(United Kingdom)	14	(Russian Fed.)	3	(Romania)	1
(USA)	12	(Thailand)	3	(Switzerland)	1
(Yugoslavia)	11	(Finland)	2	(Ukraine)	1
(Austria)	10	(Poland)	2	(Uzbekistan)	1
(Pakistan)	10	(Slovakia)	2		

We also collected data on all individual institutions. However, these data were too complex to be easily presented in a systematic way. As there were more than a thousand units too much manual reformatting would be needed if we wanted to analyze all of those institutions. We therefore present just three examples to illustrate the description of the address of an institution.

- Cottbus Brandenburg Technical Univ. (Germany). Chair of Soils Protection and Recultivation
- Universita' di Udine, Udine (Italy). Dipartimento di Biologia Applicata alla Difesa delle Piante.
- Ljubljana Univ. (Slovenia). Biotechnical Fac., Agronomy Dept.

However, we did investigate a selected type of institutions. We identified most of the university-affiliated entries, Slovenian university institutions, and departments of the Biotechnical Faculty (Table 7).

Table 7: Instances of author's university affiliation as attributed to the crop- and plant sciences-related records in the address field between 1994-2000

Type of Institution	Occ.
All university contributors	504
Slovenian universities	367
Faculties of the Ljubljana University	348
Biotechnical Faculty	334
Agronomy Dept. of the Biotechnical Faculty	188
Forestry Dept. of the Biotechnical Faculty	75
Wood Science and Techn. Dept. of the Biotechnical Faculty	39
Zootechnical Dept. of the Biotechnical Faculty	15
Food Science and Techn. Dept. of the Biotechnical Faculty	14
Biology Dept. of the Biotechnical Faculty	14

Source (SO) and type of document or publication (PT)

Agris document types do not differentiate between a monograph as an undivided publication, and a single contribution as a part of a monograph. Both groups are presented as a type B (Book=Monograph). Conference proceedings are also recorded as monograph type B. However, the proceedings also acquire an additional type C (Conference). Among the 768 documents we identified 356 documents as journal or

serial articles and 404 documents as papers in books of proceedings. Only two of these proceedings papers were published in a conventional journal. 10 documents were individual author-chapters in a multiple-author monograph.

In Table 8 we present three serials with the highest number of occurrences in the database, and three conference proceedings.

Table 8: Occurrences of crop- and plant sciences-related documents by document type and a few selected publications between 1994-2000

Document Type and Title	Occ.
<i>Serials</i>	
Zb. Bioteh. fak. Univ. Ljubl., Kmet.	116
Sodobno-kmetijstvo	58
Zbornik-gozdarstva-in-lesarstva	51
<i>Conference Proceedings</i>	
4th Slovenian Conference on Plant Protection. 1999. Lectures and Papers	70
3rd Slovenian Conference on Plant Protection. 1997. Lectures and Papers	65
Symposium on New Challenges in Field Crop Production. 1996. Proceedings	54

We can observe a very high number of plant- and crop-related papers in the conference proceedings. These are the occurrences which can impact significantly the number of total occurrences in certain years as we observed in Table 3.

4 DISCUSSION AND CONCLUSIONS

In the beginning we need to explain the method of assigning respective subject categories to documents/records according to the Agris Categorization Scheme. Most information systems employ some narrower or broader classification systems, what means that the system itself will significantly impact subsequent retrieval results. In the view of our intensive experiences with the Agris classification scheme we knew, prior to our analysis, that it would be rather difficult to retrieve "all" plant- and crop-related records. Indexing or classification procedure is a highly individual process. So is individual a concept of relevance. For example, a document dealing with animal feed will be by some users always perceived as related mostly to animal-aspects. On the other hand an "animal-feed document" may deal solely with the topic of plant physiology (e.g. growth or reproduction of certain variety of maize). Such a document will in the Agris database acquire only plant-related classification codes. On the other hand, it is sometimes almost impossible to separate plant- from animal-related classification groups. The food (Q) categories from Q01 to Q05 are assigned to documents that pertain to all aspects of food sciences. A document that deals with chemical analysis of meat or milk will acquire the same category as a document that investigates chemical properties of bread or a medicinal herb. At least there exists a sub-category of Plant-physiology-and-biochemistry (F60) which applies to the chemical (proximate) composition of plant during the period of growth. However, plant as a product (e.g. pasta) will acquire the Q category. We excluded the Q category as it does not differentiate between plant and animal products.

Our analysis embraced also documents that cover (forest) trees with regard to physiology. Thenceforth the high number of contributors from the Forestry, and Wood Science Departments of the Biotechnical Faculty. Again, with regard to physiology aspects Agris Classification makes no distinction between the so called field crops and trees. After all a cherry tree can be a source of fruit as well as high-quality wood. We finally decided to include sole F and H categories dealing mostly with production and protection of plants. This method yielded some 768 records among the 2844 records published in that period. In the continuation we comment some of the findings that have already been mentioned in the preceding chapter. It has been mentioned that we included only documents published in Slovenia. This is the policy of cooperative construction of this database to include national production and to avoid duplicates. We observed an important difference in the number of document or papers in certain years. This can be attributed to international meetings or symposia where a certain meeting may in that particular year produce much more than 50% of all contributions related to a certain (sub)discipline in that year. Majority of documents were published in Slovenian, whereas most foreign-language documents were published in English.

850 different authors contributed some 768 documents. 590 authors contributed one only document, whereas three authors contributed between as many as 21 and 28 documents. On the other hand, 49 documents contained between 5 and even 15 co-authors. The sole number of documents per author cannot really present a good picture of contributing to a research as some research groups sometime include all researchers in the group while publishing a paper. The high number of single contributors in our analysis, on the other hand, is also due to many foreign contributors who participated at the meetings. The meetings have also heavily influenced the representation by countries. We explained that it is in Agris fields difficult to exactly analyze the instances of different institutions or countries as the institution (and respective country) is entered only once if there are several authors from the same institution. Also it is difficult to statistically evaluate participation from a particular country if there are three authors from the same country, representing two different institutes. Is it single, double or triple? Nevertheless, such data can still serve as a measure of internationally of a meeting but have to be interpreted with some restraint. We can also observe that in the period under investigation more contributions were published as papers in books of proceedings (404) than as articles in conventional journals (356). In this respect a database, such as Agris, can serve as an important agency of transfer of non-conventional national data to a broader public as such data can be disregarded by some foreign documentation services which place more emphasis on conventional serials. We may conclude that even though there exist some classification particularities that make it sometimes difficult to determine some subject areas these particularities apply to all (sub)disciplines, including animal, food or feed and forestry-related data. It is then possible, by heeding these characteristics, to mutually compare the respective subdisciplines in the view of national agricultural published production.

5 POVZETEK

Prispevek bibliometrično vrednoti bibliografske elemente v dokumentih s področja znanosti o rastlinah, proizvodnje in varstva rastlin, objavljenih v publikacijah, tiskanih v Sloveniji v obdobju 1994-2000. Uporabili smo zapise v elektronski podatkovni zbirki Agris, kjer se od l. 1993 dalje sistematično zbirajo tudi slovenski dokumenti, ki jih po načelu izdaje dokumenta v Sloveniji za predstavitev v zbirki Agris obdeluje slovenski nacionalni center Agris. Med 2844 zapisi iz Slovenije v obdobju 1994-2000 je bilo 768 takih, ki so jih označevale različne (pod)kategorije iz skupin F (*Plant production*) in H (*Plant protection*). Pri teh zapisih smo analizirali različne bibliografske parametre. Število letnih objav močno niha, predvsem zaradi množične proizvodnje zbornikov s posvetovanj v posameznih letih, kjer lahko en sam zbornik objavi več kot petdeset različnih prispevkov z nekega ožjega (pod)področja. Med jeziki prevladuje slovenščina (60%), sledi ji angleščina (36%). Število drugih jezikov je zanemarljivo. Od 850 različnih avtorjev jih je 17 sodelovalo pri 10 ali več dokumentih. Trije avtorji so objavili celo po 21, 23 in 28 različnih dokumentov. 590 avtorjev pa je objavilo le po 1 dokument v obdobju 1994-2000. Visoko število slednjih je razumljivo, saj je veliko tujih gostov na posvetovanjih pri nas sodelovalo le enkrat. Pregled soavtorstva pokaže, da je 49 dokumentov objavilo po 5 ali več soavtorjev, v enem primeru celo 15 soavtorjev. 317 dokumentov je imelo le enega avtorja. Ker gre predvsem za domačo produkcijo, je bilo največ avtorjev iz Slovenije, med tujim strokovnjaki pa tistih iz Hrvaške, Nemčije, Madžarske, Italije itd. Med slovenskimi univerzitetnimi inštitucijami močno prevladuje Univerza v Ljubljani oz. Biotehniška fakulteta, ter znotraj slednje Oddelek za agronomijo. Zaradi značilnosti vnosa podatkov o avtorskem naslovu, so ti podatki le približni, saj se pojavnost inštitucije nagiba v korist dokumentov z enim samim avtorjem ali s soavtorji z različnih inštitucij. Pri soavtorjih z iste inštitucije se v polje "Address" inštitucija namreč zabeleži le enkrat. Po tipu dokumenta je bilo med vsemi dokumenti največ člankov iz revij. Veliko je bilo tudi prispevkov s posvetovanj, saj so tri najbolj plodna posvetovanja objavila po 70, 65 in 54 prispevkov v posebnih zbornikih. Izbor 768 dokumentov s področja rastlinske proizvodnje oz. varstva je bil močno pogojen s predhodnim klasificiranjem teh dokumentov v zbirki Agris. Z vidika rastlinske fiziologije oz. varstva smo tako zajeli tudi gozdno drevje v celoti, saj klasifikacijske sheme ne ločijo med rastlinskimi skupinami po tehnološki rabi. Zaradi tega je pri oceni avtorstva veliko tudi avtorjev z oddelkov za gozdarstvo oz. lesarstvo Biotehniške fakultete. Pri rastlinski proizvodnji smo z rastlinsko-fiziološkega vidika zajeli tudi krmne rastline. Iz analize pa smo morali izpustiti nekatere potencialno zanimive (pod)kategorije, npr. tiste s področja živilstva in prehrane. Te podkategorije ne ločijo med živili živalskega in rastlinskega izvora, zato je tu v skladu z obstoječimi klasifikacijskimi shemami ni mogoče sistematično določiti raziskovalnega objekta v povezavi z rastlinami oz. pridelki. Klasifikacijska shema pa sicer predvideva tudi podkategorijo "rastlinska fiziologija in biokemija", ki zajema tudi kemijsko sestavo rastline, tako da ta vidik lahko zajeli vsaj delno. Kot smo lahko videli, vsebujejo obstoječe bibliografske in klasifikacijske sheme nekatere posebnosti, ki jih pogojuje sama struktura podatkovne zbirke in se jim ob bibliografski analizi ne da sistematično izogniti. Ker pa za vsa biotehniška oz. kmetijska (pod)področja veljajo enake posebnosti oz. zakonitosti, je ob upoštevanju le-teh možno ta (pod)področja dovolj dobro medsebojno primerjati in ocenjevati.

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