Accessing the literature of food science

Catherine Curtin Mundy

Effectively managing and using information is important in all professions. Scientists, especially, rely heavily on published literature as a critical source of information. Deciding which of the thousands of journal articles, books and proceedings to read, and budgeting the time and money required is an important responsibility of professional food scientists facing the various demands of research, teaching, publishing, securing funding, and developing profitable products and applications. 'Secondary publishers' such as the Institute for Scientific Information (ISI) organize published literature and present it in a variety of useful ways.

Like other scientists, food scientists use published literature in two basic ways: to keep up with the current literature and stay abreast of recent developments in the field; and to review previously published literature, often on a particular subject. In both cases, information needs to be easily accessible and reliable. For current awareness, food scientists need focused, up-to-date information delivered regularly in a convenient format. For retrospective literature searching, comprehensiveness is required; in both cases, it is important that significant items are not overlooked.

At its headquarters in Philadelphia, PA, USA, the Institute for Scientific Information (ISI) receives over 8000 journal titles and hundreds of multi-authored books each year. The articles in each journal and book – representing over two million items annually – become the source items of a database that includes bibliographic information for scientific source items dating from 1945 to the present. From this enormous database, ISI creates new publications that appear in a variety of print and electronic formats, all designed to make finding information easier.

Coverage of food science journals

The multidisciplinary nature of ISI's database makes it an appropriate source for researchers in food science and technology, a diverse field that overlaps with disciplines such as chemistry, biotechnology, nutrition, genetic engineering and agricultural sciences. Evaluation and selection of the most significant journals in all fields of science is an ongoing process carried out by a staff of subject specialists trained as information scientists, who consult with editorial advisory boards, consider subscriber recommendations and use citation data in deciding which journals to cover in ISI's products[1,2]. ISI invites inquiries and recommendations from editors, publishers and customers regarding the inclusion of new journals. The number of journals covered is purposely restricted to limit computer storage and processing time and the size of the resulting printed and electronic products, and because of ISI's commitment to include only those scientific journals with significant impact.

When a journal is selected for coverage, every significant item in each issue is indexed so researchers can locate letters, editorials, corrections, etc., in addition to articles and reviews. All of the standard bibliographic information for each item indexed is included in the database: all authors, journal title and publication information, article title, etc. Authors' addresses are also added. The most distinguishing characteristic of the database derives from the additional inclusion of each reference listed in the bibliography of each article. Including these citation data provides researchers with another useful approach to literature searching, and enables the ISI to evaluate journals and their impact, identify trends and research fronts, and introduce innovative indexing techniques.

SCI (Jan 91 - Jun 91)
Keller-SE Nash-TC Newberg-SS Shazer-WH
The Degradation of Aspartame in Chocolate Milk Related to Processing Conditions and Subsequent Microbial Load
(English) => Article
JOURNAL OF DAIRY SCIENCE
Vol 74 Iss 4 pp 1214-1217 1991 (FM532)
Related Records: 15 References: 16
Addresses:
NUTRASWEET CO, 601 E KENSINGTON, MT-PROSPECT, IL 60056, USA
References:
BALDWIN-RE-1979-J-FOOD-SCI-V44-P938
CASE-RA-1985-STANDARD-METHODS-EXA-P327
COUSIN-MA-1982-J-FOOD-PROTECT-V45-P172
HOMLER-BE-1984-FOOD-TECHNOL-CHICAGO-V38-P50
JONES-FT-1977-J-FOOD-PROTECT-V40-P693
KELLER-SE-1991-J-FOOD-SCI-V56-P21
LANGEVELD-LPM-1973-NETH-MILK-DAIRY-V27-P54
LARSONPOWERS-N-1978-J-FOOD-SCI-V43-P41
LARSONPOWERS-N-1978-J-FOOD-SCI-V43-P47
MARSHALL-RT-1985-STANDARD-METHODS-EXA-P203
MAXCY-RB-1967-J-MILK-FOOD-TECHNOL-V30-P213
MESSER-JW-1985-STANDARD-METHODS-EXA-P133
MIKOLAJCIK-EM-1979-CULTURED-DAIRY-PRODU-V14-P6
SCHIFFMAN-SS-1979-PHYSL-BEHAVIOR-V23-P1
WATROUS-GH-1971-J-MILK-FOOD-TECHNOL-V34-P282
YU-JH-1989-J-FOOD-SCI-TECHNOL-V21-P45

Fig. 1
Result of a search for articles about aspartame in the January–June 1991 *SCI Compact Disc Edition.*

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 0924 - 2244/91/$02.00

SCI (Jan 91 - June 91)
Keller-SE Newberg-SS Krieger-TM Shazer-WH
Degradation of Aspartame in Yogurt Related to Microbial Growth (English) => Article
JOURNAL OF FOOD SCIENCE
Vol 56 Iss 1 pp 21-23 1991 (EX949)
Related Records: 20 References: 20 Shared References: 6
Addresses:
NUTRASWEET CO, 601 E KENSINGTON, MT-PROSPECT, IL 60056, USA
References:
<ANON>-1987-NUTRASWEET-TECHNICAL
BALDWIN-RE-1979-J-FOOD-SCI-V44-P938
CASE-RA-1985-STANDARD-METHODS-EXA-P327
FELLOWS-JW-1990-UNPUB
HARDIE-JM-1986-BERGEYS-MANUAL-SYSTE-V2-P1068
HOMLER-BE-1984-FOOD-TECHNOL-CHICAGO-V38-P50
KANDLER-O-1986-BERGEYS-MANUAL-SYSTE-V2-P1208
KEATING-KR-1990-J-DAIRY-SCI-V73-P54
LARSONPOWERS-N-1978-J-FOOD-SCI-V43-P41
LARSONPOWERS-N-1978-J-FOOD-SCI-V43-P47
LINKE-HAB-1976-Z-NATURFORSCH-SECT-C-V31-P245
MARSHALL-VME-1984-ADV-MICROBIOLOGY-BIO-P67
MATALON-ME-1986-J-DAIRY-SCI-V69-P2569
RADKEMITCHELL-L-1984-J-FOOD-PROTECT-V47-P245
RANNEY-RE-1976-J-TOXICOL-ENV-HLTH-V2-P441
SCHIFFMAN-SS-1979-PHYSL-BEHAVIOR-V23-P1
STEGINK-LD-1984-ASPARTAME-PHYSL-BIOC
STEGINK-LD-1987-AM-J-CLIN-NUTR-V46-P204
TAMIME-AY-1985-YOGHURT-SCI-TECHNOLO
YU-JH-1989-KOREAN-J-FOOD-SCI-TE-V21-P45

Fig. 2
The most closely related record to that depicted in Fig. 1.

SCI (Jan 91 - June 91)
Schifferstein-HNJ Frijters-JER
The Effectiveness of Different Sweeteners in Suppressing Citric-Acid Sourness (English) => Article
PERCEPTION & PSYCHOPHYSICS
Vol 49 Iss 1 pp 1-9 1991 (EU850)
Related Records: 13 References: 31 Shared References: 3
Addresses:
AGR UNIV WAGENINGEN, DEPT FOOD SCI, BOMENWEG 2, 6703 HD WAGENINGEN, NETHERLANDS
References:
ANDERSON-NH-1981-F-INFORMATION-INTEGR
BARTOSHUK-LM-1975-PHYSIOL-BEHAV-V14-P643
BIRNBAUM-MH-1978-COGNITIVE-THEORY-V3-P33
BIRNBAUM-MH-1978-PERCEPT PSYCHOPHYS-V23-P403
DEGRAAF-C-1986-CHEM-SENSES-V11-P295
DEGRAAF-C-1987-PERCEPT-PSYCHOPHYS-V41-P383
DEGRAAF-C-1988-J-EXPT-PSYCHOL-HUMAN-V14-P526
DEGRAAF-C-1989-CHEM-SENSES-V14-P81
GILLAN-DJ-1982-PERCEPT-PSYCHOPHYS-V32-P504
KROEZE-JHA-1978-CHEM-SENSES-FLAVOR-V3-P443
KROEZE-JHA-1979-PHYSL-BEHAVIOR-V22-P347
KROEZE-JHA-1982-CHEM-SENSES-V7-P81
KROEZE-JHA-1983-CHEM-SENSES-V8-P211
KROEZE-JHA-1985-PHYSIOL-BEHAV-V35-P779
KROEZE-JHA-1989-PERCEPTION-COMPLEX-S-P225
KUZNICKI-JT-1979-J-EXP-PSYCHOL-GEN-V108-P68
LARSONPOWERS-N-1978-J-FOOD-SCI-V43-P41
LARSONPOWERS-N-1978-J-FOOD-SCI-V43-P47
LAWLESS-HT-1979-J-COMP-PHYSIOL-PSYCH-V93-P538
LAWLESS-HT-1983-CHEM-SENSES-V7-P309
MCBRIDE-RL-1986-J-EXP-PSYCHOL-HUMAN-V12-P584
MCBRIDE-RL-1988-PERCEPT-PSYCHOPHYS-V44-P167
MCBRIDE-RL-1990-PERCEPT-PSYCHOPHYS-V48-P326
MOSKOWITZ-HR-1970-PERCEPT-PSYCHOPHYS-V8-P40
MOSKOWITZ-HR-1975-CHEM-SENSES-FLAVOR-V1-P411
NORGREN-R-1973-J-COMP-NEUROL-V150-P217
PANGBORN-RM-1965-FOOD-SCI-TECHNOLOGY-V3-P291
SCHIFFERSTEIN-HNJ-1990-CHEM-SENSES-V15-P87
SCHIFFMAN-SS-1979-PHYSL-BEHAVIOR-V23-P1
SCHIFFMAN-SS-1985-PHYSIOL-BEHAV-V34-P369
SHALLENBERGER-RS-1975-SUGAR-CHEM

Fig. 3
The second most closely related record to that depicted in Fig. 1.

Citation indexes

For retrospective searching, ISI compiles a variety of indexes, covering not only scientific and technical literature, but also the published literature of the social sciences, arts and humanities. The best known of the ISI citation indexes is the *Science Citation Index (SCI)*, which covers over 3100 journals. ISI also produces a variety of other indexes, including *Index to Scientific Reviews*, *Index to Scientific Book Contents*, and *Index to Scientific and Technical Proceedings*.

SCI in print

The *SCI* printed edition is four separate but interrelated indexes: citation, subject, corporate, and source (arranged by author). The printed version is produced bimonthly and cumulated annually. Twenty-two large volumes comprise the 1990 annual. Five- and ten-year cumulative indexes covering the literature from 1945 are also available.

The citation index is used to locate recent papers that cite earlier papers on the same or a related topic; by looking up the first author of an earlier paper, a researcher can find a list of authors who have recently cited the earlier work. Full bibliographic information for current articles is found in the source index. Citation indexing permits the researcher to track a paper, to examine how often and by whom it is cited in the years following its publication.

The 'Permuterm' subject index is composed of words and phrases from article titles. Searching for terms that describe the subject yields a list of authors who have used the terms in the titles of their articles. Because this index is composed of current terms used by authors in the titles of articles, it may be easier to use than an index with a rigidly controlled or hierarchical vocabulary.

The corporate index is used to find out what has been published by members of specific institutions or organizations. Searching this international index by the organization's name or geographic location yields a list of authors who published papers from that site during the period covered by the index.

SCI on compact disc

The *SCI* is also produced in a variety of electronic formats that utilize the power of computerized searching. A compact disc (CD) version of the *SCI*, covering the annuals from 1980 to the present, has been available since 1988. Updated quarterly and cumulated annually,

Table 1. Impact factors and cited half-lifes of food science and technology journals for 1989

Rank[a]	Journal	Impact factor	Cited half-life
1	*Journal of Cereal Science*	1.404	3.3
2	*Biotechnology Progress*	1.286	3.2
3	*Journal of Food Protection*	1.281	5.3
4	*Journal of Dairy Science*	1.254	8.2
5	*Critical Reviews in Food Science and Nutrition* (and *CRC Critical Reviews in Food Science and Nutrition*)	1.235	8.4
6	*Journal of the American Oil Chemists Society*	1.225	>10.0
7	*Journal of Agricultural and Food Chemistry*	1.201	9.2
8	*Journal of Dairy Research*	1.190	>10.0
9	*International Journal of Food Microbiology*	1.175	2.5
10	*Netherlands Milk and Dairy Journal*	1.115	8.7
11	*Food and Chemical Toxicology* (and *Food and Cosmetics Toxicology*)	1.089	6.1
12	*Cereal Chemistry*	1.042	>10.0
13	*Zeitschrift für Lebensmitteluntersuchung und Flurbereinigung*	0.969	6.6
14	*Journal of Micronutrient Analysis*	0.911	NA
15	*Food Technology (Chicago)*	0.911	9.2

[a]Journals ranked by impact factor
NA, Data not available

Table 2. Citation rates of the food science and technology journals with the highest impact factors

Rank[a]	Journal	Number of times cited in 1989	Number of source items 1987–1988
1	*Journal of Cereal Science*	160	114
2	*Biotechnology Progress*	81	63
3	*Journal of Food Protection*	447	349
4	*Journal of Dairy Science*	934	745
5	*Critical Reviews in Food Science and Nutrition* (and *CRC Critical Reviews in Food Science and Nutrition*)	21	17

[a]Journals ranked by impact factor

the *SCI Compact Disc Edition* affords organizations with limited shelf space local access to the index. All 22 volumes of the 1990 annual fit on one CD. The CD version combines the four indexes of the printed version, and includes features not available in the printed version.

A feature of the CD version is the 'related records' facility, which cross-references articles, and ranks the strength of their relationship based on the number of articles they cite in common. For example, a search of the *SCI Compact Disc Edition* for January–June 1991 for articles about aspartame identifies an article by Keller, Nash, Newberg and Shazer (Fig. 1). One keystroke selects the most closely related of 15 'related records' (Fig. 2). This article, also co-authored by Keller, was published in the *Journal of Food Science* and shares 6 references with the first paper. A second related paper, by Schifferstein and Frijters in *Perception and Psychophysics*, a psychology journal, shares 3 references with the first paper (Fig. 3), illustrating the value of citation indexing and the advantage of the multidisciplinary aspect of the database. Other advantages of the CD version of the *SCI* include the ability to download bibliographic information to a personal database, the ability to generate reprint requests automatically, and increased flexibility in searching. By combining terms from various fields (e.g. title words, journals and address) and limiting the search to specific document types or languages, users are more likely to identify highly relevant items faster.

SCI online

In addition to the printed and CD editions, online and magnetic tape versions of the *SCI* also exist. Through commercial database vendors in Europe and the USA, including DIALOG, Data-Star, DIMDI and ORBIT, the *SCI* can be accessed online using a modem. The online systems continue to be used more frequently by information professionals or librarians than by individual scientists. SciSearch, the online version of the *SCI*, includes an additional 1200 journals (without their cited references) that are not included in the printed and CD versions. More than 20 additional food science journals are included in the online version of the database; however, only source information is added, not cited references.

Since 1983, ISI has used citation data to identify areas of intense research activity and rapid advances. Each research front consists of a group of highly cited, co-cited, closely related papers identified by co-citation clustering. Records in SciSearch include the research front field if any reference cited in the article is a member of a research front, facilitating searching of relevant papers. Moreover, beginning in 1991, abstracts, author keywords, and the 'KeyWords Plus' index are added to the online version. KeyWords Plus identifies additional articles related to the topic, using search terms taken directly from the titles of the articles in the bibliography of the original paper, identifying related articles that would not be found using traditional search terms or methods.

SciSearch is also available on magnetic tape for loading in-house onto mainframe computer systems. Tapes can be customized by ISI to identify journals available in the leasing institution's collection.

Current Chemical Reactions

Specifically for chemists, the ISI has created a database that combines bibliographic capabilities with molecular structure searching. The Current Chemical Reactions (CCR) in-house database affords food chemists electronic access to details of new and newly modified organic reactions reported in leading chemistry journals and in US registered patents. This database was developed to work with the REACCS software

Table 3. Comparison of high-impact science journals with the leading food science journals

Rank[a]	Journal	Impact factor
	All journals	
1	*Annual Review of Biochemistry*	64.000
2	*Clinical Research*	48.500
3	*Cell*	25.208
4	*Annual Review of Immunology*	25.120
5	*Pharmacological Reviews*	23.688
	Food science journals	
855	*Journal of Cereal Science*	1.404
954	*Biotechnology Progress*	1.286
958	*Journal of Food Protection*	1.281
979	*Journal of Dairy Science*	1.254
1003	*Critical Reviews in Food Science and Nutrition* (and *CRC Critical Reviews in Food Science and Nutrition*)	1.235

[a] All journals ranked by impact factor

Table 4. Impact factors and cited half-lifes of journals in related fields

Rank[a]	Journal	Impact factor	Cited half-life
	Nutrition and dietetics journals		
1	*Annual Review of Nutrition*	4.412	4.2
2	*American Journal of Clinical Nutrition*	2.332	7.6
3	*International Journal of Obesity*	2.000	4.9
4	*Proceedings of the Nutrition Society*	1.802	7.1
5	*Journal of Nutrition*	1.719	9.4
	Biotechnology and applied microbiology journals		
1	*Bio/technology*	3.796	3.0
2	*Biosensors*	2.696	3.3
3	*Yeast*	2.509	3.0
4	*Critical Reviews in Biotechnology*	2.111	2.8
5	*Advances in Applied Microbiology*	2.077	9.9
	Agriculture journals		
1	*Journal of Agricultural and Food Chemistry*	1.201	9.2
2	*Hilgardia*	1.063	>10.0
3	*Pesticide Science*	1.016	6.3
4	*Advances in Agronomy*	1.000	>10.0
5	*Agricultural and Biological Chemistry (Tokyo)*	0.858	6.9

[a] Journals ranked within each field by impact factor

package (Molecular Design Ltd), and includes ~5500 journal articles and 1000 US patents each year, producing detailed information on more than 14000 new synthetic methods. In addition to bibliographic information, information about biological activities and reagents is included and searchable. Data covering the years 1986–1990 are currently available.

Current awareness services

Complementary to ISI's index products described above are current awareness products, the most well known of which is *Current Contents*. Two of the seven discipline-specific print editions are of particular interest to food scientists: the 'Life Sciences' edition and the 'Agriculture, Biology, & Environmental Sciences' edition. *Current Contents (CC)* is a weekly publication that lists the tables of contents of the most current issues of journals in each discipline. It is also available online and on magnetic tape.

Since 1989, these two editions have also been delivered weekly on microcomputer disks. The disk version does not include 'Current Comments', 'Press Digest', or 'Citation Classics', regular features of the printed version. The disk version may lack the portability and ease of browsing of the print version, but can significantly reduce search time as, by developing and storing a search profile, it is possible to run the search automatically each week as the new disks arrive. Researchers can narrow searches to include only specific journals, authors, title words or institutions. Bibliographic information can be easily transferred to a personal database without keying, and reprint requests can be automated. In addition, the KeyWords Plus index and optional abstracts were added to the disk version earlier this year.

ISI also produces *Research Alert*, a printed current awareness tool that focuses more specifically on individual research topics. Using the full power of the ISI's complete database, each weekly edition of *Research Alert* includes a listing of pertinent bibliographic items added that week. A confidential *Research Alert* profile can be developed for individuals seeking highly targeted and specific information, or researchers can choose from a list of hundreds of topics prepared by ISI. Three of these are of special interest to food scientists: 'Food Processing'; 'Food Additives'; and 'Food Preservation, Microbiology, and Antioxidants'. All journals in the database, in addition to food science and technology journals, are scanned for pertinent articles, providing multidisciplinary coverage.

Citation statistics

Using the citation data accumulated in the database for quite a different purpose, ISI creates the annual *Journal Citation Reports: A Bibliometric Analysis of Science Journals in the ISI Database (JCR)*. The *JCR* analyses a full year's issues of journals covered in the database. Data are organized into six different listings. The 'Subject Category Listing' (Table 1) groups journals within a discipline and ranks them by impact factor. The impact factor of a journal is a measure of the frequency with which the 'average article' in the journal has been cited in a particular year. 'Citable items' include articles, reviews and notes, but not letters, abstracts, editorials, etc. The number of times the journal is cited in a given year is divided by the total number of citable items published in the journal in the previous two years to derive the impact factor (Table 2). 'Cited half-life' is the number of publication years going back from the current year that account for 50% of the total citations received by the journal in the current year.

Impact factors vary widely in different disciplines. For example, in a list of all journals ranked by impact factor, the highest-ranking journal overall is *Annual Review of Biochemistry*, with an impact factor of 64.0; the highest-ranking food science journal is 855th on the list, with an impact factor of 1.4 (Table 3). Impact factors of journals in related fields are given in Table 4.

Summary

The goal of ISI is to offer easy-to-use tools to aid researchers in locating the important sources of information in their own and related fields. To complement the database services described, ISI also offers a full-text document delivery service, called 'The Genuine Article', providing access to, as well as information about, the relevant literature.

References

1 Garfield, E. (1986) *Essays of an Information Scientist* 8, 96–104
2 Garfield, E. (1972) *Science* 178, 471–479

Review

The Foodline scientific and technical, marketing and legislation databases

Julia M. Kernon

Foodline is a product of the Information Group of the Leatherhead Food Research Association, UK. The databases constituting Foodline can be divided into three distinct classes: scientific and technical, market intelligence, and legislation. This review presents an overview of the Foodline databases and provides some guidelines for their use.

The Foodline scientific and technical, marketing and legislation databases may be accessed by direct dialling using a modem. The modem must meet particular specifications to access Foodline, but these are standard: it should conform to V.21, V.22 or V.23 specifications, and should be set up with eight data bits, one 'stop' bit, no parity and full duplex. Access to Foodline is presently possible via the UK public data network Packet SwitchStream (PSS) or, for overseas users, via International Packet SwitchStream (IPSS) or Telenet. The benefit of operating via local 'nodes' of networks such as these is the elimination of the long-distance telephone charge incurred by dialling direct to the host computer.

The annual subscription fee to Foodline entitles the user to at least five hours of pre-paid searching time. Users then gain access simply by dialling up Foodline, and entering their personal user name and a special access password.

Foodline categorizes the information available as 'scientific and technical', 'market intelligence', or 'legislation'; the three types of data are accessed separately. New users are presented with a simple menu when they first enter their user name and password; this guides them to the required type of information. Users who have used the system more than once merely enter option 1 (scientific and technical), 2 (market intelligence) or 3 (legislation), as desired.

The science and technology database

FROSTI (Food Research on Scientific and Technical Information) is the largest of the Foodline databases, and provides bibliographic details of internationally published literature in the area. In addition to journal articles, the FROSTI database covers books, patents, conference proceedings, standards, statutory instruments and technical reports.

FROSTI can be used to answer technical questions by pinpointing relevant literature; in addition, copies of the articles can be obtained through the library of the Leatherhead Food Research Association. Information sources date from 1974 and the information is updated on a weekly basis. More than 1700 entries are made each month, the data being extracted from hundreds of journals of relevance to food scientists and technologists.

Almost all entries are supported by a concise abstract. In addition, extensive indexing terms are added by the

258555
Colorimetric micro-determination of titanium dioxide in foods.
Hamano T., Mitsuhashi Y., Aoki N., Yamamoto S., Tsuji S., Ito Y., Oji Y.
Nippon Shokuhin Kogyo Gakkaishi 1990 37 (2), 162–6 (8 ref.)
En:en:ja

A colorimetric method, using diantipyrylmethane, for the micro-determination of titanium dioxide, used as a whitener in Japan, was developed. The method was applied to the analysis of cheese, chocolate and chewing gum.

Fig. 1
Example of a complete FROSTI (Food Research on Scientific and Technical Information) document.

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