

Journal Citation Studies. 18.
Highly Cited Botany Journals

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Number 2

At a meeting of the American Phytopathological Society in 1972, I reported on journals most cited by the society's publication *Phytopathology*. None of the audience was able to guess that the third journal most frequently cited by *Phytopathology* was *Virology*. In a subsequent letter to *Phytopathology News* I listed other journals that had been cited by and that had cited *Phytopathology*.¹

In later studies^{2,3} we found it interesting to consider the journals in a particular discipline as a group--as a citing and cited unit--rather than to pick one or two leading journals to study a field. In this report, we give the results of a citation analysis of a group of botany journals. The journals that make up the group and the data base for this study are listed under the heading *Botany* in the subject-category listing of journals in the *Guide to the 1969 Science Citation Index® (SCI®)*.⁴ It should be noted that the group of journals arbitrarily chosen for this study does not include many journals that are certainly of interest to botanists. For example, journals classified in the 1969 *SCI Guide* as *primarily agricultural, agronomical, ecological, etc.* were not added to the data base.

The results of our analysis are given in Figures 1, 2, and 3. The data in the figures come from a compilation of all citations made by journals

processed for the *SCI* during the last quarter of 1969. The methodology has been described elsewhere.⁵

Figure 1 shows the fifty journals that most frequently cited the botany journals that form the data base. For each journal we give its total citations of other journals, its total citations of the botany group, its self-citations, and its overall impact factor. Columns of percentages relate some of the counts to each other.

Figure 2 shows the journals that were most frequently cited by the group of botany journals. It shows how many times each journal was cited by all journals processed for the *SCI*, by the group of botany journals, the journal's self-citation count (in the case of botany journals), and its overall impact factor. Again, columns of percentages relate some of these counts to each other. Readers may note that although the self-citation counts in Figures 1 and 2 are the same for particular journals, the self-citation rates differ. The difference has been explained in a previous editorial.⁶ The percentage in Figure 1 is the self-citing rate; the percentage in Figure 2 is the self-cited rate.

Figure 3 shows the journals common to the lists in Figures 1 and 2. Except for the last, the column information is the same as in Figures 1 and 2. The last column shows a

Figure 1. Journals that Cited Botany Journals. An asterisk in the list below indicates that the journal appears also on the list in Figure 2. A = total citations of other journals, B = total citations of botany journals, C = self-citations, D = B/A, botany citations in terms of total citations, E = C/A, self-citations in terms of total citations (self-citing rate), F = C/B, self-citations in terms of botany citations, G = overall impact (see reference 5).

Journal	A	B	C	D	E	F	G
*1. Phytopathology	2830	1399	822	49.4	29.1	58.8	1.078
*2. Annu. Rev. Phytopath.	2181	740	30	33.9	1.4	4.1	4.914
*3. Planta	1085	460	123	42.4	11.3	26.7	2.944
*4. Plant Physiology	960	369	200	38.4	20.8	54.2	1.683
*5. Plant Cell Physiol.	820	318	75	38.8	9.2	23.6	1.785
*6. Canad. J. Botany	768	312	62	40.6	8.1	19.9	1.217
*7. Botan. Rev.	772	260	6	33.7	0.8	2.3	3.818
*8. Phytochemistry	1473	258	153	17.5	10.4	59.3	1.907
*9. J. Am. Soc. Hort. Sci.	755	256	175	33.9	23.2	68.4	0.392
*10. Weed Sci.	564	255	171	45.2	30.3	67.1	1.568
*11. Amer. J. Botany	590	226	73	38.3	12.4	32.3	0.956
*12. Comptes Rendus D	3784	220	—	5.8	—	—	0.780
*13. Ecology	991	215	118	21.6	11.9	55.3	1.256
*14. Mycopath. Mycol. Appl.	2831	214	80	7.6	2.8	37.4	0.346
*15. T. Brit. Mycol. Soc.	549	212	73	38.6	13.3	34.4	0.830
*16. New Phytologist	579	210	54	36.3	9.3	25.7	1.382
*17. Agron. J.	1008	196	—	19.4	—	—	0.947
*18. J. Exp. Botany	434	191	63	44.0	14.5	33.0	2.400
*19. Physiol. Plantarum	486	185	52	38.1	10.7	28.1	1.796
*20. Protoplasma	965	184	60	19.1	6.2	32.6	2.183
21. Plant Soil	820	177	52	21.6	6.3	29.4	0.988
22. Soil Sci. Soc. Am. P.	608	177	112	29.1	18.4	63.3	0.867
*23. Mycologia	444	163	51	36.7	11.5	31.3	0.901
24. Weed Res.	467	155	28	33.2	6.0	18.1	0.837
*25. Soil Sci.	405	141	61	34.8	15.1	43.3	0.923
26. Forest Chron.	485	137	29	28.3	6.0	21.2	—
27. Indian J. Agr. Sci.	959	129	—	13.5	—	—	0.334
28. Zeit. Pflanzenphysiol.	414	124	24	30.0	5.8	19.4	1.048
29. Phyton	364	115	12	31.6	3.3	10.4	0.103
30. Ann. Amelior. Plant.	323	110	11	34.1	3.4	10.0	0.428
31. Oesterr. Bot. Zschr.	370	110	55	29.7	14.9	50.0	—
*32. Ann. Botany	242	100	30	41.3	12.4	30.0	1.443
33. Theor. Appl. Gen.	776	100	—	12.9	—	—	—
*34. Ber. Deut. Bot. Ges.	669	99	20	14.8	2.9	20.2	0.519
35. Acta Bot. Neerl.	372	98	22	26.3	5.9	22.4	0.535
36. Austr. J. Botany	266	98	24	36.8	9.0	24.5	0.297
37. Bull. Torrey Bot. Club	366	98	13	26.8	3.6	13.3	0.623
38. Dokl. Akad. Nauk SSSR	7647	94	—	1.2	—	—	0.572
*39. Crop Sci.	620	93	—	15.0	—	—	0.712
40. J. Soil Sci.	302	89	27	29.5	8.9	30.3	0.861
41. Acta Biol. Crac. Bot.	378	88	27	23.3	7.1	30.7	1.411
*42. Austr. J. Biol. Sci.	1245	88	—	7.1	—	—	1.957
*43. Ann. Appl. Biol.	431	87	67	20.2	15.5	77.0	1.386
*44. Bioch. Bioph. Acta	10269	87	—	0.9	—	—	3.287
45. Arch. Mikrobiol.	1318	83	—	6.3	—	—	2.120
46. Naturwissenschaften	1574	82	—	5.2	—	—	0.920
47. Zschr. Pflanzenzucht.	418	80	21	19.1	5.0	26.3	0.271
48. Qual. Plantenzucht. Mat. Veg.	726	74	25	10.2	3.4	33.8	0.115
49. Biol. Plant.	299	73	29	24.4	9.7	39.7	0.396
*50. Holz. Roh. Werkst.	244	72	51	29.5	20.9	70.8	0.437

Figure 2. Journals that were Cited by Botany Journals. An asterisk in the list below indicates that the journal appears also on the list in Figure 1. A = total citations by all journals. B = total citations by botany journals. C = self-citations. D = B/A, botany citations in terms of total citations. E = self-citations in terms of total citations (self-cited rate). F = C/B, self-citations in terms of botany citations. G = overall impact (see reference 5).

Journal	A	B	C	D	E	F	G
*1. Phytopathology	1713	1305	822	76.2	48.0	63.0	1.078
*2. Plant Physiology	1639	961	200	58.6	12.2	20.8	1.683
*3. Amer. J. Botany	1171	647	73	55.3	6.2	11.3	0.956
4. Nature	15310	578	—	3.9	—	—	2.244
*5. Planta	707	384	123	54.3	17.4	32.0	2.944
6. Science	9739	319	—	3.3	—	—	2.894
7. J. Biol. Chem.	17103	315	—	1.8	—	—	6.371
*8. Canad. J. Botany	548	292	62	53.3	11.3	21.2	1.217
*9. Bioch. Bioph. Acta	9500	284	—	3.0	—	—	3.287
*10. Physiol. Plantarum	482	269	52	55.8	10.8	19.3	1.796
*11. J. Am. Soc. Hort. Sci.	357	247	175	69.2	49.0	70.9	0.392
*12. Phytochemistry	588	247	153	42.0	26.0	61.9	1.907
13. Biochem. J.	7625	231	—	3.0	—	—	3.193
*14. Weed Sci.	311	223	171	71.7	55.0	76.7	1.568
*15. Ann. Botany	424	215	30	50.7	7.1	14.0	1.443
16. Plant Dis. Rep.	286	205	—	71.7	—	—	0.268
*17. J. Exp. Botany	337	200	63	59.4	18.7	31.5	2.400
*18. Ecology	577	193	118	33.5	20.5	61.1	1.256
19. Bot Gaz.	312	186	9	59.6	2.9	4.8	0.658
20. P. Nat. Acad. Sci. USA	8206	164	—	2.0	—	—	8.828
*21. New Phytologist	295	159	54	53.9	18.3	34.0	1.382
22. Annu. Rev. Pl. Phys.	290	154	0	53.1	0.0	0.0	7.047
*23. Mycologia	302	148	51	49.0	16.9	34.5	0.901
24. J. Bacteriology	4138	146	—	3.5	—	—	3.594
25. J. Cell Biol.	4769	145	—	3.0	—	—	3.484
*26. Agron. J.	727	143	—	19.7	—	—	0.947
*27. Soil Sci.	629	136	61	21.6	9.7	44.9	0.923
28. Arch. Bioch. Bioph.	3647	135	—	3.7	—	—	3.519
29. Virology	2373	124	—	5.2	—	—	4.720
*30. Austr. J. Biol. Sci.	583	116	—	19.9	—	—	1.957
*31. Ann. Appl. Biol.	453	113	67	24.9	14.8	59.3	1.386
*32. Comptes Rendus	5472	110	—	2.0	—	—	0.780
*33. Plant Cell Physiol.	203	108	75	53.2	37.0	69.4	1.785
34. J. Agr. Res.	267	101	—	37.8	—	—	—
*35. T. Brit. Mycol. Soc.	263	97	73	36.9	27.8	75.3	0.830
36. Amer. Rev. Resp. Dis.	874	93	—	10.6	—	—	0.834
*37. Crop. Sci.	353	88	—	24.9	—	—	0.712
38. J. Chem. Soc.	13978	85	—	0.6	—	—	3.123
*39. Protoplasma	299	85	60	28.4	20.1	70.6	2.183
40. J. Amer. Chem. Soc.	26307	82	—	0.3	—	—	5.859
*41. Mycopath. Mycol. Appl.	120	80	80	66.7	66.7	100.0	0.346
*42. Ber. Deut. Bot. Ges.	175	76	20	43.4	11.4	26.3	0.519
*43. Annu. Rev. Phytopath.	108	74	30	68.5	27.8	40.5	4.914
44. Bioch. Biophys. Res.	3404	70	—	2.1	—	—	4.468
*45. Plant Soil	202	68	52	33.7	25.7	76.5	0.988
46. J. Ecology	156	67	—	43.0	—	—	0.421
47. J. Forestry	150	66	35	44.0	23.3	53.0	0.197
48. J. Gen. Microbiol.	1438	65	—	4.5	—	—	2.337
*49. Holz. Roh. Werkst.	123	65	51	53.0	41.5	78.5	0.437
*50. Botan. Rev.	160	64	6	40.0	3.8	9.4	3.818

Figure 3. Journals Common to Figures 1 and 2. A = total citations by all journals. B = total citations by botany journals. C = self-citations. D = B/A, botany citations in terms of total citations. E = self-citations in terms of total citations (self-cited rate). F = C/B, self-citations in terms of botany citations. G = overall impact (see reference 5). H = 'botanical' impact.

Journal	A	B	C	D	E	F	G	H
1. Annu. Rev. Phytopath.	108	74	30	68.5	27.8	40.5	4.914	251.6
2. Botan. Rev.	160	64	6	40.0	3.8	9.4	3.818	182.0
3. Planta	707	384	123	54.3	17.4	32.0	2.944	182.0
4. J. Exp. Botany	337	200	63	59.4	18.7	31.5	2.400	122.8
5. Weed Sci.	311	223	171	71.7	55.0	76.7	1.568	105.6
6. Physiol. Plantarum	482	269	52	55.8	10.8	19.3	1.796	98.4
7. Plant Cell Physiol.	203	108	75	53.2	37.0	69.4	1.785	97.6
8. Plant Physiology	1639	961	200	58.6	12.2	20.8	1.683	96.4
9. Phytopathology	1713	1305	822	76.2	48.0	63.0	1.078	86.8
10. New Phytologist	295	159	54	53.9	18.3	34.0	1.382	85.2
11. Canad. J. Botany	548	292	62	53.3	11.3	21.2	1.217	72.4
12. Phytochemistry	588	247	153	42.0	26.0	61.9	1.907	70.4
13. Ann. Botany	424	215	30	50.7	7.1	14.0	1.443	63.2
14. Protoplasma	299	85	60	28.4	20.1	70.6	2.183	62.0
15. Amer. J. Botany	1171	647	73	55.3	6.2	11.3	0.956	53.6
16. Ecology	577	193	118	33.5	20.5	61.1	1.256	52.8
17. Mycologia	302	148	51	49.0	16.9	34.5	0.901	43.6
18. Austr. J. Biol. Sci.	583	116	—	19.9	—	—	1.957	40.4
19. J. Am. Soc. Hort. Sci.	357	247	175	69.2	49.0	70.9	0.392	39.2
20. Ann. Appl. Biol.	453	113	67	24.9	14.8	59.3	1.386	31.6
21. Soil Sci.	629	136	61	21.6	9.7	44.9	0.923	28.0
22. Plant Soil	202	68	52	33.7	25.7	76.5	0.988	27.6
23. T. Brit. Mycol. Soc.	263	97	73	36.9	27.8	75.3	0.830	27.2
24. Holz. Roh. Werkst.	123	65	51	53.0	41.5	78.5	0.437	26.0
25. Agron. J.	727	143	—	19.7	—	—	0.947	24.0
26. Ber. Deut. Bot. Ges	175	76	20	43.4	11.4	26.3	0.519	20.4
27. Mycopath. Mycol. Appl.	120	80	80	66.7	66.7	100.0	0.346	16.8
28. Crop Sci.	353	88	—	24.9	—	—	0.712	13.2
29. Bioch. Bioph. Acta	9500	284	—	3.0	—	—	3.287	10.8
30. Comptes Rendus	5472	110	—	2.0	—	—	0.780	1.2

'botanical' impact. That is the average number of citations per article when only citations by botanical journals in the data base for this study are considered. The journals listed in Figure 3 are ranked by this botanical impact.

The botanical impact factor is calculated in the same manner as the overall impact (see reference 5), using botanical citations rather than all citations. Thus, the botanical impact is four times the number of last-quarter-1969 botanical citations of 1967 and 1968 articles, divided by the number of articles published in 1967 and 1968. In the case of these specialty impacts, we then multiply the result by 100 to make it easier to distinguish between overall and specialty impacts in our listings. It is an arbitrary convention that

does not affect relative standings.

It should be remembered that the counts in these figures come from a compilation of a single quarter-year's data. A quadrupling of the counts would approximate annual values. We are now preparing an updating of *ISI's Journal Citation Reports*[™] 7,8 based on all 1972 citations. In future studies of this type, the full 1972 data will make such quarter-to-annual extrapolation unnecessary.

To reiterate, Figure 1 shows the journals that use botanical journals most heavily. Of the approximately 14.5 thousand citations received by

the data-base botany journals, the fifty journals listed in Figure 1 accounted for about 9.9 thousand, or 68%. A high self-citation rate may account for the rank of a journal on this list. It is interesting to note that *Annual Review of Phytopathology* and *Botanical Review* ranked second and seventh respectively, despite their extremely low self-citation rates. That says a great deal about the importance and the nature of review material. I find it surprising that only one genetics journal appears on the list--item 33, *Theoretical and Applied Genetics*.

In contrast, Figure 2 shows what journals botanical journals use most. Of the approximately 17.7 thousand citations made by the data-base botany journals, the fifty journals listed in Figure 2 accounted for about 10.4 thousand, or 59%. As in so many other fields, we find high on this list journals of general science, biochemistry, and certain related specialties. *Nature* and *Science* rank fourth and sixth. *Virology* is 29th. An unexpected but interesting intruder is *American Review of Respiratory Diseases*. It owes its place on this list solely to its frequent citation by *Mycopathologia et Mycologia Applicata*. It is interesting to note, in spite of the availability of an English translation of the

botanical section of the *Doklady Akademii Nauk SSSR*, that it does not appear on the list of journals in Figure 2. If the list is extended, the *DAN* turns up about 130th.

Finally, in Figure 3 we have the journals common to Figures 1 and 2. Thus they are the journals most heavily cited by botany journals that are at the same time themselves the heaviest citers of botany journals. As mentioned above, Figure 3 gives both overall and 'botanical' impacts. In most cases, the journals in Figure 3 have high overall impact factors. It should be noted that the important *Botanical Gazette* does not appear on the list in Figure 3, in spite of its high overall impact, simply because it does not appear on the list in Figure 1. *Botanical Gazette* is not, relatively speaking, a heavy citer of the botanical journals that form the data base of this study.

In the next two issues of *Current Contents*[®] we will provide a list of most cited articles published in botany journals from 1948 to 1972. In addition, we will list highly cited botanical articles from the non-botany journals in Figure 2. We have arbitrarily divided this article listing into two parts--articles from plant physiology journals, and from all other journals.

1. Garfield, E. Most frequently cited phytopathology journals. *Phytopathology News* 6(3):4, 1972.

2. Journal citation studies. 9. Highly cited pediatric journals and articles. *Current Contents (CC®)* No. 29, 17 July 1974, p. 5-9.

3. Journal citation studies. 15. Cancer journals and articles. *CC* No. 42, 16 October 1974, p. 5-12.

4. *Science Citation Index 1969 Guide and Journal Lists*. (Philadelphia: Institute for Scientific Information, 1970), p. 6.

5. Garfield, E. Citation analysis as a tool in journal evaluation. *Science* 178: 471-79, 1972.

6. Journal citation studies. 17. Journal self-citation rates--there's a difference. *CC* No. 52, 25 December 1974, p. 5-7.

7. ISI's *Journal Citation Index* data base--a multi-media tool. *CC* No. 16, 19 April 1972, p. 5-8.

8. The new *ISI Journal Citation Reports* should significantly affect the future course of scientific publication. *CC* No. 33, 22 August 1973, p. 5-6.