STATISTICAL DATA REGARDING THE BOTANICAL LITERATURE OF 1930 WITH A GENERAL DISCUSSION

by

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Contents.

1. Introduction.

An enormous bulk of literature exists on every field of Science and, besides, the increase is rapid. Of course this holds also true for Botany. The writer has collected accurate data regarding the botanical literature which appeared in 1930. These data will be discussed in the present paper. Moreover, attempts will be made to give suggestions with regard to the efficiency of publication.

An illustration of the quantity of existing literature may be given by quoting Giltay (3, pp. 28—29), who estimated

the number of literature citations in a certain large book as 40890. Supposing that each cited publication contains but one page, the total number would make 43 volumes in the size of Meyer's well known "Konversations-lexikon"!

2. Methods.

As sources of information the very valuable Lists of Currant Literature, Botany, issued by the Bureau of Plant Industry of the United States Department of Agriculture, were used. As far as I can judge, these lists are very complete. Only papers that have appeared in journals, were taken into consideration, so that my data do not refer to books.

Of each paper were noted: the language, whether or not it contained a summary in a world-language (English, German, French), whether or not it was illustrated, and the number of pages. Furthermose classification took place after the following subjects:

1. Morphology and Anatomy.
2. Systematics, Geography and Nomenclature.
3. Physiology, including biochemical studies related to plants.
4. Genetics.
5. Cytology.
6. Phytopathology.
7. Mycology.
8. Plant Breeding.
9. Personalia.
10. Miscellaneous.

The Genetics-group only contains botanical papers, of course. It should be kept in mind, when judging the genetical data, that zoological papers are not included. The line between Phytopathology and Mycology is drawn after the criterion whether the attention is focussed on the

relation between host plant and parasite or on the fungus. No distinction has been made between pure and applied botany, since such a distinction is entirely artificial. However, a number of papers which could not be classified in other groups, have been united in a Plant Breeding-group.

As every classification, the present one might have been done differently. Originally many more groups were distinguished, but this proved to be impractical. On the whole the classification was easily done and this increases the value of the followed system. Those papers, treating f.i. "The morphology and physiology of ....." were put in the first mentioned group, consequently, in the present case, in Morphology.

The tables, giving detailed information, are given as appendix. Totalizing was done with the aid of a Dalton writing adding-machine. Whenever possible, checking took place by horizontal totalizing.

Table 1 summarizes data on the different specialized fields of botany. Data regarding the number of illustrated - no summary, illustrated - summary, not illustrated - no summary and not illustrated - summary papers on each field and separated according to language were collected. Owing to the high costs of printing these ten tables will not be published. The writer will be glad, however, to send them to fellow workers, who apply for them.

In table 2 the total number of papers (and pages) in the different languages — arranged after decreasing total number of papers — are summarized, while table 3 mentions additional data regarding the average number of pages per paper.

For the rest, the tables speak for themselves.

3. Conclusions.

In 1930 a total number of 7216 botanical papers with a total number of 113700 pages appeared (see tables 1

and 2). The average number of pages is therefore 15.7 (see table 3).

The ten volumes of the "Handwörterbuch der Naturwissenschaften" (Jena, Gustav Fischer, 1912—1915) contain 12396 pages. Consequently the total botanical literature of 1930 takes over 91 volumes in the size of the "Handwörterbuch" and almost 6¼ meter shelf in a book-case.

According to table 1, the main subjects are Systematics c.a. with 33.5 %, Phytopathology with 22.8 %, and Physiology with 20.9 % of the total number of papers. The seven remaining groups comprise but 22.8 %.

On the whole there are about just as many illustrated papers as not illustrated ones, but Morphology and Anatomy, Cytology, next Genetics, have considerably more illustrated than not illustrated papers, namely resp. 79.8 %, 78.4 %, 60.3 % of the total numbers for these groups.

The average number of pages per paper does not vary much in the different groups. Excluding Personalia and Miscellaneous, the relatively small average number of pages on Phytopathology is noteworthy. In all cases illustrated papers are longer than not illustrated ones. On the average the former are exactly twice as long as the latter.

According to table 2, more than half of all papers, namely 51.5 %, are written in English. Next come German papers with 21.1 % and French ones with 11.1 % of the total. Consequently the remaining 22 languages take but 16.3 %. The most important of these minor languages are Russian with 3.7 %, Italian with 2.9 %, Spanish with 2.3 %, Dutch with 2.0 %.

Out of the 16.3 % papers in languages other than English, German and French, 40.8 % contain a summary either in English, German or French. Consequently 59.2 % or 9.6 % of the total number of papers, do not contain such a summary. This means that a botanist, who

has a reading knowledge of but the three main languages, cannot read at all 9.6 % and can only read a usually very short summary of 6.7 % of the world-literature. The relatively very large number of Russian papers with a summary, namely 90.0 %, is just as striking as the relatively very small number of Italian and Spanish papers with a summary, namely resp. 0.0 % and 1.2 %. In judging the value of this percentage-number for the other languages, the absolute number of papers should be kept in mind.

As to the average number of pages per paper (table 3), we see that Russian papers are the largest, English the shortest, when we exclude the languages with a smaller total than 1 %. The data of table 3 below "Ukranian" have very little or no significance, since they refer to very small absolute numbers. We then see that illustrated papers are longer than not illustrated ones. A similar fact has already been noticed when discussing the subjects. Furthermore, papers with a summary in a world-language average about 1½ × the papers without such a summary, both among the illustrated and the not illustrated ones. This difference is far more considerable than can be ascribed to the length of the summary. Therefore we may draw the conclusion that larger papers are more frequently illustrated than smaller ones and that the former contain a summary in a world-language more often than the latter.

Many more conclusions of minor importance can be drawn from the tables. This may be left, however, to those interested in special fields.

4. General discussion.

It needs no further illustration that it is absolutely impossible for the individual worker to read the whole literature. But even if we take the smallest specialized field which is Plant Breeding with 208 papers and 4025 pages, we see that in order to keep up wtih the literature

on his restricted field, the plant breeder has to read, to think over and to memorize the main results of over 11 pages a day. Even without any research work or teaching, this is a pretty hard job, the more since at least some reading on related fields and on Science in general is highly desirable.

Publication should therefore be done as efficient as possible. In the following I shall give some suggestions which, in my opinion, may increase the efficiency of publication. Of course I can nothing but state my personal limited views. Perhaps this may lead to an international discussion of the subject, however.

In an appendix to his textbook on bacterial plant-diseases — which I think to be still more important than the textbook itself — the late Erwin F. Smith (4, p. 643) says: "The object of publication is to let other persons know what we have discovered". We have to do this in the most efficient way, making thus our publications easily accessible to those investigators working on the same subject, making them easily to be read all over the world, making them easily to be cited in card indexes and abstracting journals. Although writing and publishing may give quite a lot of satisfaction to the writer, we write primarily for others and therefore we should make our publications according to how they are most efficient to the reader.

At most American universities courses on the preparation of manuscripts are run. Also, there are some valuable books on the subject, for instance Anomymous (1), Anonymous (2), Trelease and Yule (6), furthermore Suager's paper (5).

Analyzing a publication technically, we get the following.

Language. Writing in a world-language is preferable to writing in a language which can only be read by a very limited number of workers. The data from the preceding

chapter clearly indicate English as the botanical world-language. If English could be made the official world language, other investigators than those living in an English speaking country, would only have to learn one foreign language. Besides, personally I prefer reading and even writing in bad English to not being able to read at all and to write in a language which most of my fellow workers will not be able to read.

Of course there may be good reasons for writing in the language of the investigator's own country. These papers should contain an English summary, however. We have seen that especially the larger publications have summaries in a world-language. There is no reason for this, however, since small papers are as a rule no less important than large ones.

Title. This should be as concise as possible. Unnecessary long titles should be avoided, because it takes more time to index them. Frequently plant names are mentioned both in the language of the publication and in Latin. This is unnecessary. Latin names are preferable.

If the paper contains a summary in a world-language, a full translation of the title in this world-language should be given immediately after the main title. The usual indication "with a summary in English" does not tell anything about the contents of the paper. The translated title may be preceded by the indication: "with a summary: . . . . . " and may be printed in smaller capitals than the main title and in parentheses.

Author's name and address should be mentioned right before or after the title, not at the end of the paper.

Date of publication. Also in journals which mention the date of receipt of manuscript, it is desirable to mention the date on which the manuscript was finished. This last date should be used when judging priority.

Table of contents. At the beginning of those papers

which are divided in chapters or sections, a table of contents gives a valuable review of the scope of the work. Printing the table of contents at the end of the paper is much less useful.

Division and sub-division of larger publications in chapters and sections makes them read much easier. A short introduction should give the general scope of the publication and, if possible, also the main results. Apart from a summary in a world-language, a summary in the original language should always be added, also to very short papers. It is nothing but a matter of taste to dislike the printing of such a summary at the beginning of the article.

Figures and tables should be clear and should contain clear legends, as the case is in two languages. This holds also true for heads of tables.

Literature citations. There are different ways of citing literature. It is a matter of taste which way to follow, if only the citations are complete and contain: Author, title, journal with volume, year and pages. Personally I do not like the use of Roman figures and I do not like footnotes, since they distract the attention from the text. Alphabetical lists of literature with references in the text by numbers in parentheses have the advantage that they give an easy review of the existing literature on the subject treated. In making those lists, the use of cards is very comfortable. In many cases the citations in the text should not only refer to a number in the list of literature, but also to one or more pages of the publication cited.

The paper as a whole should be as brief as possible without omitting important detailed information. Publications with many printing errors do not give the impression to be accurately treated and therefore do not deserve much confidence. It is very important to have a manuscript commented upon by others, before it is printed. The

manuscript might even be written by another than by the "writer" himself. These other persons need not always be acquainted with the special field of the publication; a general critical attitude will do.

Reprints. Erwin F. Smith (4, p. 643) says: "Always secure *and distribute* several hundred separates". Considering the tremendously large number of journals, the importance of receiving reprints of papers on fields of study in which we are especially interested, can not be over-estimated. Of course, this also means the distribution of reprints of our own publications.

Reprints with a cover should mention the author's name and address and the full title — as the case is in two languages — on the outside. Also a complete citation of the place of publication, containing name of journal, volume, year and pages, should be printed on the cover and, if there is no cover, on top of the first page. This makes indexing as easy as possible. Changing of pages has the only effect that it causes confusion in citations; it should therefore be avoided. Double paging has no use either.

As to *journals* I should like to make the following remarks. The name should be as short as possible. I prefer having to cite "Genetics" to f.i. "Zeitschrift für induktive Abstammungs- und Vererbungslehre". Abbreviations of the name, used in citations, should not be too fragmentary. Uniformity in the use of abbreviations would be desirable. The table of contents of a number of a journal should be placed on the first cover-page.

Publication of papers on a specialized field should be done in a journal which is primarily devoted to this field. For instance, a genetical paper should be published in a genetical journal, not in a general journal or in a journal specializing in another field.

Frequently one and the same research work is published twice, once in a semi-popular form, once in a more technical

form, or once in a Report or Bulletin, once in a journal. If a certain number of journals could be indicated as publishing only first hand technical papers, we should not have to watch regularly the contents of the other journals, reports etc. which would save a considerable lot of time. In addition, it would be very important if a certain number of journals could be indicated as specializing on a certain field. This would also decrease considerably the number of journals which a specialist has to consult regularly. If f.i. genetical papers would only appear in the eight or ten journals, especially devoted to Genetics, this would be a much more efficient way than publishing genetical papers in some hundred or more journals, not especially devoted to Genetics.

Reports, Circulars, Bulletins of Institutions, etc. are by far a worse place to publish than a journal is, because usually journals are easier accessible. In many cases the edition of bulletins etc. of institutions comes forth from a chauvinistic attitude. Serializing reprints from journals — as f.i. the Boyce Thompson Institute for Plant Research does — guarantees a wider distribution and, moreover, will be cheaper. However, complete citation of place of publication and no changing of pages should be done.

Abstracting journals with extensive registers, deserve all support whatsoever from individual workers. Abstracting should be done as concise as possible, but also as complete as possible and as fast as possible. Restricted fields are to be preferred to large fields. An excellent example of a highly valuable abstracting journal is the "Review of Applied Mycology". "Biological Abstracts" with no less than 5500 journals to abstract — quoted from: Phytopathology 20, 1930: 460 — covers too large a field to be valuable as a whole to the individual worker.

In addition to the importance of abstracting journals, I draw the attention to the importance of monographs on

certain specialized fields of study, to be written by specialists.

The efficiency of botanical publications can doubtlessly considerably be increased, when international agreements could be arrived at, when international rules could be fixed, regarding the technical phase of publication. As a result of the above general discussion, I mention the following points which may be made subject to an international discussion:

1. The promoting of English to botanical world-language.

2. A uniform system of composing publications as to title, mentioning of author's name and address, date of publication, table of contents, summary, figures and tables, literature citations and the exterior of reprints are concerned.

3. Uniformity with regard to abbreviations of names of journals. Indicating a number of journals as "technical". Indicating groups of journals as especially devoted to certain specialized fields. Decreasing the number of reports, bulletins, etc. and replacing them by journal articles.

Of course these points are nothing but suggestions which I personally consider to be important. Finally, I suggest that the subject of publication be discussed at the International Botanical Congress at Amsterdam in 1935 and that attempts be made to arrive at international agreements with regard to some or all of the above mentioned points as well as to other important points, overlooked by the writer.

5. Summary.

1. The botanical literature of 1930 consists of 7216 papers with 113700 pages. This refers to 91 volumes of the "Handwörterbuch der Naturwissenschaften".

Systematics c.a., Phytopathology and Physiology take over ¾ of the whole literature.

On the whole there are about just as many illustrated papers as not illustrated ones. Especially Morphology and Anatomy, Cytology, next Genetics, are more frequently illustrated than the average.

The number of pages per publication averages 15.7. However, illustrated papers average twice as many pages as not illustrated ones and papers with a summary in another language than the paper itself are about 1½ times as long as papers without such a summary.

More than half of all papers are written in English, namely 51.5 %; next come German and French with 21.1 % resp. 11.1 %. Botanists, who have a reading knowledge of but English, German and French, cannot read 9.6 % of the whole literature at all and can read 6.7 % only in the form of a summary.

2. The efficiency of publication has been amply discussed. This led the writer to suggest that at the International Botanical Congress at Amsterdam in 1935 attempts will be made to increase the efficiency of publication. A number of points which may be subject to discussion, have been mentioned.

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Literature cited.

(1) Anonymous: A manual of style. A compilation of typographical rules governing the publications of the University of Chicago, with specimens of types used at the University Press. — Chicago, Ill., Univ. of Chicago Press, 1919, 292 pp.

(2) Anonymous: Style manual of the Government Printing Office. — Washington D. C., 1922, 224 pp.

(3) Giltay, E.: Fragmenten uit het onderwijs. (Mededeelingen Landbouwhoogeschool 24, No. 6, 1923, 52 pp. With German summary).

(4) Smith, Erwin F.: An introduction to bacterial diseases of plants. — Philadelphia and London, W. B. Saunders Cy, 1920, XXX + 688 pp.

(5) Suager, E. W.: On proper wording of titles of scientific papers. (Science 60, 1924, pp. 13—15).

(6) Trelease, Sam. F. and Emma Sarepta Yule: Preparation of scientific and technical papers. — Baltimore, U.S.A., Wilkins Cy, 1925, 113 pp.

TABLE 1.

Summarizing table, comparing data on subjects.

Subject	absolute number of papers	number of papers, expressed in % of total	% of illustrated papers	% of not illustrated papers	average number of pages per paper		
					illustrated	not illustrated	total
Morphology & Anatomy	268	3,7	79,8	20,2	19,9	12,1	18,3
Systematics							
Geography	2415	33,5	46,1	53,9	23,3	11,9	17,2
Nomenclature							
Physiology	1507	20,9	45,1	54,9	23,2	10,9	16,5
Genetics	345	4,8	60,3	39,7	24,0	12,4	19,4
Cytology	236	3,3	78,4	21,6	18,2	13,8	17,3
Phytopathology	1647	22,8	46,7	53,3	16,3	7,5	11,6
Mycology	307	4,2	47,2	52,8	24,0	13,7	18,6
Plant Breeding	208	2,9	54,8	45,2	25,9	11,3	19,3
Personalia	149	2,1	52,3	47,7	5,7	2,8	4,4
Miscellaneous	134	1,8	31,3	68,7	16,7	11,4	13,1
all groups together ...	7216	100,0	49,2	50,8	21,3	10,6	15,7

TABLE 2. Total number of papers (and pages), appeared in 1930.

Language	illustrated, no summary	illustrated, summary	not illustrated, no summary	not illustrated, summary	total	number of papers expressed in % of total	% of number of papers with a summary
English	1790 (31356)	—	1929 (17132)	—	3719 (48488)	51,5	0,0
German	826 (20093)	10 (439)	682 (9255)	2 (118)	1520 (29905)	21,1	0,8
French	315 (6746)	—	484 (4011)	—	799 (10757)	11,1	0,0
Russian	17 (701)	126 (4889)	10 (195)	113 (2314)	266 (8099)	3,7	90,0
Italian	92 (1904)	—	114 (1367)	—	206 (3271)	2,9	0,0
Spanish	101 (1950)	2 (118)	61 (653)	—	164 (2721)	2,3	1,2
Dutch	55 (607)	31 (1096)	50 (481)	9 (182)	145 (2366)	2,0	28,0
Latin	21 (1130)	—	59 (1152)	1 (23)	81 (2305)	1,1	1,2
Japanese	14 (221)	25 (410)	18 (261)	17 (193)	74 (1085)	1,0	57,0
Swedish	25 (373)	9 (216)	20 (223)	3 (45)	57 (857)	0,8	21,0
Hungarian	—	18 (201)	4 (34)	26 (208)	48 (443)	0,7	92,0
Csecho Slovakian	1 (9)	17 (425)	4 (74)	15 (142)	37 (650)	0,5	87,0
Polish	1 (5)	14 (325)	2 (7)	9 (186)	26 (523)	0,4	88,0
Danish	5 (219)	2 (90)	6 (110)	—	13 (419)	0,2	15,0
Ukranian	1 (6)	8 (104)	—	3 (11)	12 (121)	0,2	92,0
Bulgarian	—	5 (134)	—	4 (62)	9 (196)	0,1	100,0
Finnish	—	3 (355)	—	6 (270)	9 (625)	0,1	100,0
Norwegian	3 (228)	1 (34)	3 (154)	2 (56)	9 (472)	0,1	33,3
Rumanian	1 (22)	2 (51)	2 (6)	3 (23)	8 (102)	0,1	62,5
Portuguese	1 (35)	1 (80)	3 (60)	—	5 (175)	0,07	20,0
Yugo Slovakian	—	2 (14)	—	2 (28)	4 (42)	0,06	100,0
Hebrew	—	2 (10)	—	—	2 (10)	0,02	100,0
Chinese	1 (16)	—	—	—	1 (16)	0,01	0,0
Esthonian	1 (23)	—	—	—	1 (23)	0,01	0,0
Lettish	—	—	1 (29)	—	1 (29)	0,01	0,0
Total	3271 (65644)	278 (8991)	3452 (35204)	215 (3861)	7216(113700)	100,08	

total illustrated : 3549 (74635), that is 49,2 % of grand total
total not illustrated : 3667 (39065), that is 50,8 % of grand total
total without summary: 6723 (100848)
total with a summary : 493 (12852)
of all languages besides English, German and French are with a summary 481 (12295) in a total of 1178 (24550), that is 40,8 %.

TABLE 3.

Average number of pages per paper in the different languages.

Language	Illustrated	Not illustrated	Total
English	17,5	8,9	13,0
German	24,6	13,7	19,7
French.....	21,4	8,3	13,5
Russian	39,1	20,4	30,4
Italian	20,7	12,0	15,9
Spanish	20,1	10,7	16,6
Dutch	19,8	11,2	16,3
Latin	53,8	19,6	28,4
Japanese	16,2	13,0	14,7
Swedish.....	17,3	11,7	15,0
Hungarian.....	11,2	8,0	9,2
Csecho Slovakian.	24,1	11,4	17,6
Polish	22,0	17,5	20,1
Danish.....	44,1	18,3	32,2
Ukranian	12,2	3,7	10,1
Bulgarian	26,8	15,5	21,8
Finnish	118,3	45,0	69,4
Norwegian	65,5	42,0	52,4
Rumanian	24,3	5,8	12,7
Portuguese	57,5	20,0	35,0
Yugo Slovakian ..	7,0	14,0	10,5
Hebrew	5,0	0,0	5,0
Chinese	16,0	0,0	16,0
Esthonian	23,0	0,0	23,0
Lettish.....	0,0	29,0	29,0
Average	21,3	10,6	15,7

total illustrated, no summary : 20,7 pages per paper
total illustrated, summary : 32,3 pages per paper
total not illustrated, no summary: 10,2 pages per paper
total not illustrated, summary : 17,5 pages per paper
all groups together : 15,7 pages per paper