

IMPERIAL BUREAU OF SOIL SCIENCE

TECHNICAL COMMUNICATION No. 43^N

LAND CLASSIFICATION FOR LAND-USE PLANNING

by

G. V. JACKS



Price, 4s. od.

(Published by the Imperial Bureau of Soil Science, Harpenden, England)

1946

IMPERIAL AGRICULTURAL BUREAUX

EXECUTIVE COUNCIL,

2 Queen Anne's Gate Buildings, London, S.W.1.

IMPERIAL BUREAU OF SOIL SCIENCE,

Rothamsted Experimental Station, Harpenden, Herts.

IMPERIAL BUREAU OF ANIMAL NUTRITION,

The Reid Library, Rowett Institute, Bucksburn, Aberdeen.

IMPERIAL BUREAU OF ANIMAL HEALTH,

Veterinary Laboratory, New Haw, Weybridge, Surrey.

IMPERIAL BUREAU OF PLANT BREEDING AND GENETICS,

School of Agriculture, Cambridge.

IMPERIAL BUREAU OF PASTURES AND FORAGE CROPS,

Penglais, Aberystwyth.

IMPERIAL BUREAU OF ANIMAL BREEDING AND GENETICS,

King's Buildings, University of Edinburgh, Scotland.

IMPERIAL BUREAU OF HORTICULTURE AND PLANTATION CROPS,

East Malling Research Station, East Malling, Kent.

IMPERIAL BUREAU OF AGRICULTURAL PARASITOLOGY,

Winches Farm, Hatfield Road, St. Albans, Herts.

IMPERIAL BUREAU OF DAIRY SCIENCE,

Shinfield, near Reading, Berks.

IMPERIAL FORESTRY BUREAU,

New Bodleian Building, Parks Road, Oxford.

IMPERIAL BUREAU OF SOIL SCIENCE

TECHNICAL COMMUNICATION No. 43

LAND CLASSIFICATION FOR LAND-USE PLANNING

by

G. V. JACKS



Price, 4s. 0d.

(Published by the Imperial Bureau of Soil Science, Harpenden, England)

1946

Made and Printed in
Great Britain by the
HERALD PRINTING WORKS,
CONEY STREET, YORK

CONTENTS

	PAGE
LAND CLASSIFICATION AND LAND-USE PLANNING	I
TYPES OF LAND CLASSIFICATION	10
THE PHYSICAL CLASSIFICATION OF LAND	12
LAND INVENTORIES	14
THE U.S. SOIL SURVEY	16
LAND TYPES AND SOIL TYPES	19
Land types and genetic soil types — — — — —	20
LAND-USE CLASSES	22
AGRICULTURAL REGIONS	25
The estimation of population capacity — — — — —	29
Population and land quality — — — — —	30
THE USE OF NATURAL VEGETATION AS AN INDICATOR OF LAND QUALITY	31
Plant indicators of forest-site quality — — — — —	34
Grassland indicators — — — — —	37
SYSTEMS OF LAND CLASSIFICATION	40
1. Michigan — — — — —	40
2. U.S. Soil Conservation Service — — — — —	42
3. Tennessee Valley Authority — — — — —	47
4. New York State — — — — —	50
5. Western Canada — — — — —	52
<i>Saskatchewan</i> — — — — —	52
<i>Alberta</i> — — — — —	53
6. Ontario — — — — —	55
7. New Zealand — — — — —	56
8. Great Britain — — — — —	56
9. Prussia — — — — —	61
10. Land classification for irrigation purposes — — — — —	64
THE ESTIMATION OF PRODUCTIVITY	68
Productivity ratings — — — — —	69
The Storie index — — — — —	70
Canadian rating systems—	
<i>Saskatchewan</i> — — — — —	71
<i>Alberta</i> — — — — —	71
Ranking coefficients — — — — —	72
German soil ratings— <i>Bodenbonitierung</i> — — — — —	73
BIBLIOGRAPHY	82
APPENDIX	86

BIBLIOGRAPHY

1. ABLEITER, J. K. Productivity ratings of soil types. *Missouri Agric. Expt. Sta. Bull.* 421, 1940 (13-24).
2. ALDOUS, A. E. AND SHANTZ, H. L. Types of vegetation in the semi-arid portion of the United States and their economic significance. *J. Agric. Res.* 28, 1924 (98-128).
3. ALLIN, B. W. Soil scientists have a planning job. *Proc. Soil Sci. Soc. Amer.* (1941), 6, 1942 (3-7).
4. ASTOR, VISCOUNT, AND ROWNTREE, B. SEEBOHM. Mixed farming and muddled thinking. MacDonald, London (n.d.), pp. 143.
5. BAKER, O. E. Agricultural regions of North America. *Econ. Geog.* 2, 1926 (459-493).
6. BARNES, C. P. AND VOGEL, H. A. Land classification for general land use planning. *Missouri Agric. Expt. Sta. Bull.* 421, 1940 (283-288).
7. BAUSMAN, R. O. Merits and limitations of some of the land classes. *J. Farm. Econ.* 23, 1941 (899-903).
8. BENNETT, H. H. There's but one way to do the job. *Soil Conservation* 11, 1945 (123-127).
9. BLANCH, G. T. AND STEWART, C. E. Utilization of irrigable land in the reservation area of Uinta Basin, Utah. *Utah Agric. Expt. Sta. Bull.* 303, 1943, pp. 53.
10. BOWSER, W. E. Soil surveys in relation to land classification in Alberta. *Sci. Agric.* 20, 1940 (285-290).
11. CAJANDER, A. K. The theory of forest types. *Acta Forest. Fenn.* 29, 1926, pp. 108.
12. CAMP, J. R. The classification of lands for forest management. *Missouri Agric. Expt. Sta. Bull.* 421, 1940 (203-211).
13. CLEMENTS, F. E. Experimental ecology in the public service. *Ecology* 16, 1935 (342-363).
14. COILE, T. S. Forest classification ; classification of forest sites with special reference to ground vegetation. *J. Forestry* 36, 1938 (1062-1066).
15. COKE, J. Land classification in Western Canada. *Sci. Agric.* 21, 1941 (378-387).
16. COLBY, C. C. Changing currents of geographic thought in America. *Ann. Assoc. Amer. Geogrs.* 26, 1936 (1-37).
17. CROWTHER, E. M. Fertilizers during and after the war. *Bath and West Soc. Pamph.* 13, 1945, pp. 51.
18. CUMBERLAND, K. B. The survey and classification in New Zealand ; a basis for planning. *Trans. Roy. Soc. N.Z.* 74, 1944 (185-195).
19. EISENHOWER, M. S. Federal responsibilities in total conservation. In *Conservation of Renewable Natural Resources*, pp. 175-189. Univ. Pennsylvania Press, 1941.
20. FACKLER. *Wochenbl. Landw. Ver. Bayern* 114, No. 41, 1928. (Cited by [74].)
21. GALBRAITH, A. V. In *Forests in relation to climate, water conservation and erosion. S. Afric. Dept. Agric. Bull.* 159, 1935, pp. 62.
22. GERASIMOV, I. P., ZAVALISHIN, A. A. AND IVANOVA, E. N. [A new scheme for a general soil classification for the U.S.S.R.] *Pedology* No. 7, 1939 (10-43).
23. GERICKE, S. Die Wirkung verschiedener Wachstumsfaktoren auf die Ertragsleistung deutscher Wiesen. *Bodenk. PflErnähr.* 34, 1944 (213-239).
24. GOODSON, J. B. The appraisal of agricultural productivity. *Thesis, London*, 1939, pp. 188. (Typescript.)
25. GÖRZ, G. Wissenschaft und Praxis in der Bodenbonitierung. *Trans. Third Internat. Cong. Soil Sci.* 1, 1935 (276-279).
26. GRANGE, L. I. A basic scheme for land classification. *N.Z. J. Sci. Tech.* 26A, 1944 (136-141).
27. GRAY, L. C. AND REGAN, M. Needed points of development and reorientation in land economic theory. *J. Farm. Econ.* 22, 1940 (34-46).
28. GROSS, N. C. A post mortem of country planning. *J. Farm. Econ.* 25, 1943 (644-661).
29. HAGGERTY, J. J. AND MYERS, A. M. Materials and techniques of modern land classification. *Missouri Agric. Expt. Sta. Bull.* 421, 1940 (100-122).
30. HERRMANN, R. Die Ergebnisse der Bodenuntersuchungen. *ForschDienst.* 16, 1943 (165-173).

31. HERZOG, F. Boden und Bodenbeschaffenheit. *In Gefüge und Ordnung der deutschen Landwirtschaft*, pp. 87-103. Berlin, 1939.
32. HESSELMAN, H. Studier över barrskogens humustäcke, dess egenskaper och beroende av skogsvården. *Medd. Statens Skogsförsöksanst.* 22, 1925 (169-552).
33. HEUSER, O. Der Kulturboden, seine Charakteristik und seine Einteilung vom landwirtschaftlichen Gesichtspunkt. *In Blanck's Handbuch der Bodenlehre* 8, 1931 (1-48).
34. HILGARD, E. W. Soils. Macmillan, New York, 1914, pp. 593.
35. HILLS, G. A. An approach to land settlement problems in Northern Ontario. *Sci. Agric.* 23, 1942 (212-216).
36. HOCKENSMITH, R. D. AND STEELE, J. G. Classifying land for conservation farming. *U.S.D.A. Farm. Bull.* 1853, 1943, pp. 45.
37. HOLLSTEIN, W. Eine Bonitierung der Erde auf landwirtschaftlicher und bodenkundlicher Grundlage. *Petermanns Mitt. Ergänzungsh.* 234, 1937, pp. 49.
38. HUDSON, G. D. The unit area method of land classification. *Ann. Assoc. Amer. Geogr.* 26, 1936 (99-112).
39. HUDSON, G. D. The theory of land classification. 2. The contribution of geography to land classification. *Missouri Agric. Expt. Sta. Bull.* 421, 1940 (174-183).
40. IMPERIAL BUREAU OF SOIL SCIENCE. Soil survey for irrigation purposes in South Africa. *Tech. Commun.* 15, 1930, pp. 11. (Mimeo.)
41. IMPERIAL BUREAU OF SOIL SCIENCE. Tea Soils. By H. H. Mann. *Tech. Commun.* 32, 1935, pp. 66.
42. JONASSON, O. Agricultural regions of Europe. *Econ. Geog.* 2, 1926 (19-48).
43. KELLOGG, C. E. A system of land classification. *Trans. Third Internat. Cong. Soil Sci.* 1, 1935 (283-286).
44. KELLOGG, C. E. Soil survey manual. *U.S.D.A. Misc. Pub.* 274, 1937, pp. 135.
45. KELLOGG, C. E. The theory of land classification. I. The contributions of soil science and agronomy to rural land classification. *Missouri Agric. Expt. Sta. Bull.* 421, 1940 (164-173).
46. KELLOGG, C. E. AND ABLEITER, J. K. A method of rural land classification. *U.S.D.A. Tech. Bull.* 469, 1935, pp. 30.
47. KENDALL, M. G. The geographical distribution of crop productivity in England. *J. Roy. Stat. Soc.* 102, 1939 (21-62).
48. KRUSEKOPF, H. H. Land classification in relation to the soil and its development. I. Physical aspects. *Missouri Agric. Expt. Sta. Bull.* 421, 1940 (39-44).
49. LILIENTHAL, D. E. T.V.A. Penguin Books, Harmondsworth, 1944, pp. 208.
50. LOVEJOY, P. S. Theory and practice of land classification. *J. Land Pub. Util. Econ.* 1, 1925 (160-175).
51. MAGNITSKY, N. K. [Agropedological division into regions as a method of planned study and utilization of the soil.] *Pedology* No. 5, 1941 (98-100).
52. MARBUT, C. F. Russia and the United States in the world's wheat market. *Geog. Rev.* 21, 1931 (1-21).
53. MARBUT, C. F. Land classification. "Life and Work of C. F. Marbut," pp. 215-227. *Soil Sci. Soc. Amer.* (n.d.), pp. 271.
54. MEVIUS, W. Die Bestimmung des Fruchtbarkeitszustandes des Bodens auf Grund des natürlichen Pflanzenbestandes. *In Blanck's Handbuch der Bodenlehre* 8, 1931 (49-106).
55. MILNE, G. Composite units for the mapping of complex soil associations. *Trans. Third Internat. Cong. Soil Sci.* 1, 1935 (345-347).
56. MILNE, G. A report on a journey to parts of the West Indies and the United States for the study of soils, February to August, 1938. *E. Afric. Agric. Res. Sta. Amani* 1940, pp. 78.
57. MINISTRY OF WORKS AND PLANNING, LONDON. Report of the committee on land utilization in rural areas. *Cmd. 6378*, 1942, pp. 138.
58. MITCHELL, J. A method for obtaining a comparative rating of Saskatchewan soils. *Sci. Agric.* 20, 1940 (281-284).

59. MOHR, E. C. J. The relation between soil and population density in the Netherlands Indies. *C. R. Cong. Internat. Géog. Amsterdam 2*, Sect. IIIc, 1938 (478-493).
60. MOON, J. W. The soil type as a unit for land classification in the Tennessee Valley area. *Proc. Soil Sci. Soc. Amer.* (1937) **2**, 1938 (489-493).
61. MÜCKENHAUSER, E. Auswertung von Bodenkarten für Planungszwecke. *C. R. Cong. Internat. Géog. Amsterdam 2*, Sect. V, 1938 (87-89).
62. NATIONAL RESOURCES PLANNING BOARD. Report on land classification in the United States. Washington, 1941, pp. 151.
63. NEW ZEALAND. 18th Rept. Dept. Sci. Indust. Res. 1944, pp. 57.
64. NORTON, E. A. Soil conservation survey handbook. *U.S. Dept. Agric. Misc. Pub. 352*, 1939, pp. 40.
65. OSMOND, D. A. An index for use in the regional classification of land for agricultural purposes. *Long Ashton Agric. Hort. Res. Sta. Ann. Rept.* (1944), 1945 (219-224).
66. PAGE, J. C. Land classification to determine the feasibility of reclamation projects. *Missouri Agric. Expt. Sta. Bull.* **421**, 1940 (247-255).
67. PENTZ, J. A. The value of botanical survey and the mapping of vegetation as applied to farming systems in South Africa. *Bot. Surv. S. Africa Mem.* **19**, 1938, pp. 15.
68. PENTZ, J. A. An agro-ecological survey of Natal. *Proc. Eighteenth Ann. Cong. S. Afric. Sug. Tech. Assoc.* 1944 (65-68).
69. PETERSEN, A. Taxation von Wiesenländereien. Berlin, 1927. (Cited by [54].)
70. ROTHKEGEL, W. Die Auswertung der Ergebnisse der Bodenschätzung. *ForschDienst.* **17**, 1944 (71-84).
71. ROTHKEGEL, W. AND HERZOG, H. Das Verfahren der Reichsfinanzverwaltung bei der Bewertung landwirtschaftlicher Betriebe. *Ber. über Landw.* **10**, 1928, Sonderh.
72. ST. CLAIR THOMPSON. Forest conditions in the Gold Coast. *Imp. For. Inst. Pap.* **1**, 1936, pp. 10. (Mimeo.)
73. SAMPSON, A. W. Plant indicators—concept and status. *Biol. Rev.* **5**, 1939 (155-206).
74. SCHATTENFROH. In *Praktische Bodenuntersuchung und Bodenbeurteilung*. By A. von Nostitz. Paul Parey, Berlin, 1929, pp. 156.
75. SCHOENMANN, L. R. Essential elements in land classification. *Proc. Soil Sci. Soc. Amer.* (1936) **1**, 1937 (453-454).
76. SHANTZ, H. L. Natural vegetation as an indicator of the capabilities of land for crop production in the Great Plains area. *U.S.D.A. Bur. Pl. Indust. Bull.* **201**, 1911, pp. 100.
77. SMITS, M. B. Population density and soil utilization in the Netherlands Indies. *C. R. Cong. Internat. Géog. Amsterdam 2*, Sect. IIIc, 1938 (500-506).
78. *Soil Conservation* **11**, 1945, p. 126.
79. SPENCE, C. C. AND HOPE, E. C. An economic classification of land in fifty-six municipal divisions, south central Saskatchewan. *Canada Dept. Agric. Pub. 728 (Tech. Bull. 36)*, 1941, pp. 42.
80. STAMP, L. D. The land classification scheme of the land utilisation survey of Britain. *Trans. Third Internat. Cong. Soil Sci.* **3**, 1936 (138-140).
81. STAMP, L. D. The land of Britain and its use. *In the press.*
82. STAMP, L. D. A regional survey of European agriculture. *Advance. Sci.* **2**, 1942 (156-158).
83. STEWART, A. AND PORTER, W. D. Land use classification in the special areas of Alberta. *Canada Dept. Agric. Pub. 731 (Tech. Bull. 39)*, 1942, pp. 73.
84. STORIE, R. E. An index for rating the agricultural value of soils. *Calif. Agric. Expt. Sta. Bull.* **556**, 1933, pp. 44.
85. STREMME, H. Die Böden Deutschlands und der freien Stadt Danzig. *Petermanns Mitt. Ergänzungsh.* **226**, 1936, pp. 74.
86. STREMME, H. International soil map of Europe. Gea Verlag, Berlin, 1937.
87. STREMME, H. AND OSTENDORFF, E. *Petermanns Mitt. Ergänzungsh.* **228**, 1937.
88. TAMM, O. Markstudier i det nordsvenska bartskogsområdet. *Medd. Statens Skogsförsöksanst.* **17**, 1920 (49-300).

89. TAYLOR, M. W. Indicators of southwestern range conditions. *U.S.D.A. Farm. Bull.* 1782, 1937, pp. 35.
90. THAER, A. VON. Versuch einer Ausmittlung des Reinertrages der produktiven Grundstücke. Berlin, 1813.
91. TYLER, H. S. Materials and techniques of modern land classification. Discussion. *Missouri Agric. Expt. Sta. Bull.* 421, 1940 (129-134).
92. UNITED NATIONS CONFERENCE ON FOOD AND AGRICULTURE. Final act. Cmd. 6451, 1943, pp. 40.
93. VAN AARTSEN, J. P. Land classification in relation to its agricultural value: a review of systems applied. *Mo. Crop Rept. Agric. Stat.* 35, 1945 (79S-166S).
94. VEATCH, J. O. Graphic and quantitative comparisons of land types. *J. Amer. Soc. Agron.* 27, 1935 (505-510).
95. VEATCH, J. O. The idea of the natural land type. *Proc. Soil Sci. Soc. Amer.* (1937) 2, 1938 (499-503).
96. VEATCH, J. O. Agricultural land classification and land types of Michigan. *Mich. Agric. Expt. Sta. Spec. Bull.* 231, 1941, pp. 67. (First revision.)
97. VEATCH, J. O. Land classification for general land use planning. Discussion. *Missouri Agric. Expt. Sta. Bull.* 421, 1940 (289-292).
98. WHITTLESEY, D. Major agricultural regions of the Earth. *Ann. Assoc. Amer. Geogr.* 26, 1936 (199-240).
99. YOUNGS, F. O. Factors influencing irrigation development and classification of land for irrigation. *Proc. Soil Sci. Soc. Amer.* (1937) 2, 1938 (505-507).

APPENDIX

OUTLINE OF A U.S. SOIL-SURVEY REPORT

(Reproduced from [44])

In order to achieve some uniformity in the treatment and arrangement of subject matter in the report, especially for the convenience of those using large numbers of these reports, the outline which follows has been prepared. This outline cannot be followed blindly, as each area has its own particular features and problems requiring emphasis, and certain sections, given only broad headings, must be carefully organized in subdivisions.

GENERAL ARRANGEMENT OF MATERIAL IN THE SOIL-SURVEY REPORT

- I. Description of the area surveyed.
 - (A) Location and extent of the area.
 - (1) General location within the State or Territory.
 - (2) Distance of county seat or principal town from one or more important places.
 - (3) Size of area in square miles.
 - (B) Physiography.
 - (1) Mention of the physiographic division of the United States in which the area is located.
 - (2) General description of the physiography and geology of the area.
 - (C) Relief.
 - (1) Discussion of any modification of the physiographic surface by natural dissection.
 - (2) Sketch map of relief areas if such a sketch is of material assistance to the discussion.
 - (D) Elevation.
 - (1) General elevation of the area and ranges in elevation.
 - (2) Altitude of some of the main topographic features.
 - (3) Altitude of towns or other known points. (Cite authority for data.)
 - (E) Vegetation.
 - (1) General but brief discussion of the vegetation, including especially the original and present forests, grasses, or shrubs. (Ordinarily there should be no detailed description of species unless this is important where many comparatively uncommon plants are mentioned. The common names should be used, but a glossary of botanical names should be given, especially where noncrop plants need to be discussed at length.)

- (F) Organization and population of the county.
 - (1) Date of settlement.
 - (2) Important historical data.
 - (3) Source and distribution of the population.
 - (4) Nationality of the settlers. (To be supported by census data.)
- (G) County seat and principal towns.
 - (1) Name of county seat.
 - (2) Principal towns and their relation to the agriculture of the area.
- (H) Transportation, markets, and other cultural features.
 - (1) Railroads and highways and the service rendered by them.
 - (2) Any service rendered by steamship lines.
 - (3) The disposition and marketing of farm products.
 - (4) Conditions of public roads.
 - (5) Schools, churches, telephones, and other features relating to rural culture and social life.
- (I) Industries.
 - (1) Important nonagricultural manufacturing industries, mining, and other industries affecting the area should be mentioned and any relationship these have to the agriculture of the area noted. (The plants engaged in processing agricultural products, such as flour mills and cheese factories, are discussed under H (3).)

2. Climate.

- (1) General type, that is, oceanic, continental, etc.
- (2) Variations among seasons.
- (3) Distribution of rainfall during the growing season.
- (4) Influence of physiography and bodies of water on climate in different parts of the area.
- (5) Climate as a factor in the production of special crops.
- (6) Discussion on value of the data on average dates of frost and average frost-free periods.
- (7) Discussion on value of data on average annual means for precipitation.
- (8) Conditions, favorable or unfavorable, for farm work.
- (9) Tables from Weather Bureau of temperature, precipitation, and frosts.
- (10) Discussion of unusual weather conditions, such as winds, storms, and hail.

3. Agricultural history and statistics.

- (A) Early agricultural development of the area.
- (B) Important changes that have taken place in the use of the land since settlement.
- (C) Census data on the agriculture of the area as far back as available and up to and including latest census reports.
- (D) Present condition of agriculture.
 - (1) Use of fertilizers, lime, and other amendments.
 - (a) Amount and cost.
 - (b) Kind of fertilizers used.
 - (2) Labor.
 - (a) Kind and availability of labor. (Do not discuss the specific wages paid in different farm operations as conditions change from year to year.)
 - (3) Size of farms.
 - (a) General range in the size of farms and the size of the average farm. (To be checked by census data.)
 - (b) Any trends toward change in size of farms and the reasons for such change.
 - (4) Tenure of farms.
 - (a) Percentage of farms operated by the owners and by tenants.
 - (b) Systems of rental, such as cash rent, share of crop, or other.

4. Soil-survey methods and definitions.

- (1) Description of methods used in mapping soils.
- (2) Definition of terms used in the description and classification of soils.

5. Soils and crops.

- (1) General characteristics of the soils of the area.
- (2) Systems of agriculture practiced.
- (3) Relationship between soils and agriculture.
- (4) Grouping of soils on the basis of capability for use.
- (5) Brief description of each group.
 - (a) Agronomic relationships.
 - (b) Characteristics common to soils in the group that determine use.
 - (c) The names of series in the group and the characteristics of the types of the series brought into this group.

(d) Description of each type and phase of the group, including all the following features, if applicable.

I. Describe each horizon as to :—

- a. Color.
- b. Texture.
- c. Structure.
- d. Consistence.
- e. Thickness.
- f. Reaction.
- g. Content of organic matter.
- h. Stoniness.
- i. Root penetration.
- j. Salt or alkali.

2. Important variations within the type.

3. Location and extent of soil.

a. General location of the larger areas and definite location of areas of minor types.

b. Estimate in square miles of areas of each type.

4. Relief.

5. Geologic origin of parent material.

6. Drainage (external and internal).

7. Native vegetation, if important.

8. Uses to which soil is put and crop yields woven in with capabilities of soil.

Approximate acreage in different crops.

9. Management of the soil. Systems of management compared with those of area as a whole. Susceptibility to erosion or deterioration from other causes under wrong management.

10. Methods of drainage or irrigation.

II. Water supply if related to soil type.

6. Land uses and agricultural methods.

(A) Capabilities of soils for use.

(1) Crops, (2) native pasture, (3) forests.

(2) Successful and improved methods of management as demonstrated within the area.

(3) Results obtained by experiment on soil types or closely related types, including :—

(a) Use of various fertilizers, lime or other chemical treatments.

(b) Rotations.

(c) Farm implements.

(d) Prevention of erosion.

(e) Tillage.

(f) Drainage.

(g) Varieties of plants.

(h) Plant diseases, insect pests, and noxious weeds.

(This discussion should be specific in respect to the separate soils.)

7. Drainage, irrigation, or alkali amelioration (not always necessary).

(Indicate exact meaning of the term "alkali" in each particular report.)

8. Productivity ratings.

(Instructions on this chapter will be supplied in each instance.)

9. Morphology and genesis of soils.

(A) Location of the area with reference to the great soil groups.

(B) Parent materials.

(C) Factors of environment influencing soil development.

(D) Description of normal regional profile and a few of the more important variations.

(E) Character of intrazonal and azonal soils.

10. Summary.

(A) Brief discussion of area and its agriculture.

(B) Uses made of soils and reason for such use.

(C) General statement of the character of the soils.

(D) Brief description of the soil groups and their relation to agriculture.

(E) Names of the principal soils, their characteristics, and their influence on the agriculture.

This outline should be followed in preparing the report, unless some special individual feature of an area makes some change imperative in order to achieve a logical presentation of the material.

LIST OF PUBLICATIONS

I. TECHNICAL COMMUNICATIONS

No.		pp.	Price
10	THE ARRANGEMENT OF FIELD EXPERIMENTS AND THE STATISTICAL REDUCTION OF THE RESULTS (by R. A. Fisher and J. Wishart)	24	2s. od.
14.	WEIGHTS AND MEASURES OCCURRING IN AGRICULTURAL PUBLICATIONS OF THE EMPIRE OVERSEAS	4	6d.
15.	SOIL SURVEY FOR IRRIGATION PURPOSES IN SOUTH AFRICA ...	11	1s. od.
17.	PROCEEDINGS OF A CONFERENCE ON SOIL SCIENCE PROBLEMS—September, 1930	44	1s. 6d.
20.	LUCERNE INOCULATION AND THE FACTORS AFFECTING ITS SUCCESS (by H. G. Thornton)	39	1s. 6d.
23.	THE RECLAMATION OF ALKALI LAND IN HUNGARY (by A. A. J. de 'Sigmond)	26	1s. 6d.
26.	THE DISPERSION OF SOILS IN MECHANICAL ANALYSIS	31	2s. od.
27.	LAND AMELIORATION IN GERMANY (by H. Janert)	32	2s. od.
29.	SOIL, VEGETATION AND CLIMATE	43	2s. od.
34.	TROPICAL SOILS IN RELATION TO TROPICAL CROPS	60	2s. 6d.
35.	THE DESIGN AND ANALYSIS OF FACTORIAL EXPERIMENTS (by F. Yates)	96	5s. od.
36.	EROSION AND SOIL CONSERVATION*	206	5s. od.
37.	SOIL STRUCTURE (by E. W. Russell)	40	2s. od.
38.	SOIL-BORNE FUNGI AND THE CONTROL OF ROOT DISEASE (by S. D. Garrett)	54	2s. 6d.
39.	THE MINOR ELEMENTS OF THE SOIL	86	4s. od.
40.	THE ROTHAMSTED FIELD EXPERIMENTS ON THE GROWTH OF WHEAT (by Sir E. J. Russell and D. J. Watson) ...	163	7s. 6d.
41.	THE TAKE-ALL DISEASE OF CEREALS (by S. D. Garrett) ...	40	2s. 6d.
42.	THE MINERALOGY OF SOIL COLLOIDS (by G. Nagelschmidt) ...	33	2s. 6d.

*Also published by the Imperial Bureau of Pastures and Forage Crops as Bulletin No. 25.

II. SOILS AND FERTILIZERS

A comprehensive abstract journal of soil science, issued four times yearly. Each issue contains about 500 abstracts and references to current literature besides short editorials, reviews and other matter of general interest. A special edition printed on one side only of the page, so that the abstracts can be cut out and filed, is obtainable.

<i>Subscription Rates</i>	<i>British Commonwealth</i>	<i>Foreign</i>
Ordinary edition, per annum	20s. od.†	25s. od.
Special edition " "	25s. od.†	30s. od.
Both editions " "	40s. od.†	50s. od.
Single copies (ordinary edition only)	7s. 6d.	7s. 6d.

†NOTE.—These reduced rates are obtainable only when the order is sent *direct* to the Bureau from the subscriber. They are not applicable to foreign orders or to British orders sent through a trade agent.

III. ANNUAL REPORTS

Nos. 1, 2, 4, 7 to 11 each, 6d.

IV. LISTS OF REPRINTS AVAILABLE ON LOAN

No. 1 (October, 1932) 1s. 6d.
Subsequent issues each, 6d.

V. BIBLIOGRAPHY OF SOIL SCIENCE, FERTILIZERS AND GENERAL AGRONOMY, 1931-1934; 1934-1937; 1937-1940; (1940-1944 in Press)

Complete reference books to the recent literature of soil and allied sciences. Each bibliography contains over 6,000 classified references, a comprehensive subject index, and lists of authors, journals and periodicals.

Crown octavo. Bound in cloth. Price 25s. od. each.

SPECIAL PUBLICATION

"The Katamorphism of Igneous Rocks under Humid Tropical Conditions." By the late Professor Sir John Burchmore Harrison, C.M.G.

Published on behalf of the British Association and Demerara Proprietors, Ltd., this monograph gives a detailed account of the author's work during thirty-seven years in British Guiana, on the processes of laterization.

Crown quarto: 80 pp., with a foreword by Sir E. J. Russell and a preface by Professor F. Hardy. Price 5s. od.

DISCONTINUED SERIES

The following series of multigraphed periodicals were discontinued in December, 1937. Annual sets (some incomplete) are obtainable at the prices given below.

"Publications Relating to Soils and Fertilizers" (monthly), 1935 (8 issues), 6s. od.; 1936 (10 issues), 7s. 6d.; 1937 (10 issues), 7s. 6d.

"Monthly Letters," 1935 (10 issues); 1936 (12 issues); 1937 (11 issues). 4s. od. per annum.

"Recent Developments in Soil Analysis" (quarterly). 16 issues (Nos. 5 and 11 missing), 7s. od.