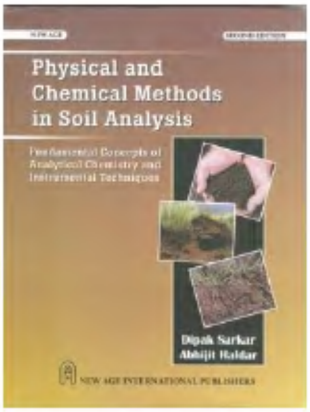

Physical and Chemical Methods in Soil Analysis: Fundamental Concepts of Analytical Chemistry and Instrumental Techniques, Second Edition. Dipak Sarkar and Abhijit Haldar. New Age International (P) Limited Publishers, 4835/24, Ansari Road, Daryaganj, New Delhi 110 002. 2010. xv + 211 pp. Price: Rs 495.

Soil plays an important role in providing food for humans as it supports and facilitates crop growth. In particular, soil near the surface (top soil) is a major zone for root development; it carries major fraction of nutrients, supplies a large share of water used by plants and is physically (ploughing) and chemically (addition of fertilizers, lime, organic matter) manipulated to optimize crop production[1]. Evaluation of the physical, chemical and biological properties of top soil becomes important in assessing and manoeuvering its suitability for crop production. Further, measurement of changes in soil properties with time serves as an indicator to monitor land management for optimum crop production[2]. The book by Sarkar and Haldar on *Physical and Chemical Methods in Soil Analysis* is therefore a contribution in this direction.

The book is organized into four sections. Section 1 deals with the fundamental concepts of instrument techniques like pH, electrical conductivity (EC) and spectrophotometry. Section 2 deals with experimental methods to determine the physical properties of soils. It describes procedures to determine the particle size distribution, bulk density, water content, porosity and saturated hydraulic conductivity of soil samples. Section 3 deals with experimental techniques to determine the chemical properties of soils, such as pH, EC, organic carbon content, NKP measurements, exchangeable cation and anion contents, alkalinity and chloride contents, trace metals, lime and gypsum requirements of the soils. Section 4 deals with some fundamental concepts of analytical chemistry.

Perusal of the book contents brings out certain points that merit discussion. Similar to their importance in agriculture, the physical and chemical properties of soils play an important role in civil engineering practice, such as design of foundations for buildings and pavements, construction of compacted fills and earth retaining structures and more recently in construction of waste retaining structures-engineered landfills. However, unlike agricultural practice, where the top soil plays an important role in crop production, properties of deeper soil deposits (for example, soil depths extending to two to four times the width of the building foundation – termed foundation soil in subsequent discussions to distinguish it from top soil) are important in civil engineering applications and the top soil layer is often discarded in civil engineering constructions.

Having stated that, however, many of the physical and chemical properties of top soil are also relevant in case of foundation soils. For example, grain size distribution/soil texture (refers to distribution of mineral particles of various sizes) and soil structure (refers to geometrical arrangement of aggregates and intra-aggregate units and bonds between aggregate units) that determine soil consistency, permeability and resistance to deformation are equally important for both soil types. Soil texture of top soil is important as it affects the moisture holding capacity, nutrient availability and consistency of the soil. Soil texture is important in foundation soils for similar reasons with the exception of nutrient availability. Soil–water content of top soils is important as it is essential for plant growth, acts as a solvent for plant nutrients and regulates soil air and temperature[1]. Soil water is important in foundation soils as it influences the contact (effective) stress between soil grains, which in turn controls the resistance to deformation under applied loads. Cation exchange capacity (CEC) is an indicator of the reservoir of nutrient cations available for crop growth, while CEC of foundation soils indirectly reflects the soil's water holding ability. Soils with high CEC are characterized by higher water contents and are therefore problematic as an engineering material. Atterberg limits that are widely used to determine the consistency limits of foundation soils were in fact devised by Alfred Atterberg (1846–1916), a Swedish agriculture scientist. Similarly, the filter paper method widely used to characterize matric suction of unsaturated soil deposits were devised for use in soil science and agronomy[3]. These examples underline the relevance of soil physical and chemical properties in agriculture and civil engineering practices albeit with different implications in some instances. The examples also highlight the cross-flow of knowledge that exists between the two disciplines. Given the common interests to evaluate physical and chemical properties of soils in agricultural science and civil engineering and the existing cross-flow of knowledge, the book could have benefitted by borrowing from the soil testing procedures detailed in soil engineering practices.

Determination of saturated hydraulic conductivity of soils is taken as an example to illustrate how cross-flow of knowledge could benefit the test procedures detailed in the book to be more precise for the students to follow. In the soil physics section of the book, constant head method is recommended for very porous soils and the falling head method for slowly permeable soils and the procedures do not mention the range of particle size or range of permeability coefficients for which the tests are applicable. BIS 2720 (part 36-1987)[4] recommends the constant head test for disturbed granular (particle size range 2–10 mm or 10–20 mm) soils containing $< 10\%$ passing 75 micron Indian Standard (IS) sieve. For maximum particle size < 9.5 mm and soils with coefficient of permeability in the range of 10^{-3}–10^{-7} cm/s, BIS 2720 (part 17-1986)[5] recommends the use of constant and falling head permeability test depending on the type of soil. Casagrande[6] recommends the use of constant head test for clean gravel, clean sand, and clean sand and gravel mixtures having coefficient of permeability in the range of 10^{2}–10^{-3} cm/s and falling head test for clean sands, clean sand and gravel mixtures, very fine sands, organic and inorganic silts and impervious soils having coefficient of permeability in the range of 10^{-1}–10^{-9} cm/s. Again in the falling head test procedure, the book briefly indicates the method to obtain an undisturbed soil sample (from

the field) for laboratory testing. Information about the role of dry density/moisture content/soil structure on permeability coefficients of soils or sample preparation technique for disturbed/representative soil samples for permeability testing by falling head test is not elucidated. Wealth of information on the importance of these parameters in influencing the permeability coefficient values and sample preparation techniques for representative soils is available in geotechnical engineering literature (for example, refs 7 and 5) that could have been made use of in this book.

Physical and Chemical Methods in Soil Analysis appears to be a popular book for undergraduate and postgraduate students of agricultural universities as it is currently in its second edition. According to the information provided by the authors, the second edition is strengthened by including topics in environmental soil/water chemistry. Perhaps, the third edition could consider culling information from geotechnical engineering literature to bolster the soil physics section.

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3. Gardner, R., *Soil Sci.*, 1937, **43**, 277–283.
4. BIS 2720, Method of test for soils: laboratory determination of permeability of granular soils (constant head), Bureau of Indian Standards, New Delhi, part 36-1987.
5. BIS 2720, Method of test for soils: laboratory determination of permeability, Bureau of Indian Standards, New Delhi, part 17-1986.
6. Casagrande, A., Notes on Soil Mechanics – First Semester, Harvard University (unpublished), 1938, p. 129 (referred in Holtz and Kovacs 1981).
7. Holtz, R. D. and Kovacs, W. D., *An Introduction to Geotechnical Engineering*, Prentice Hall, New Jersey, 1981.

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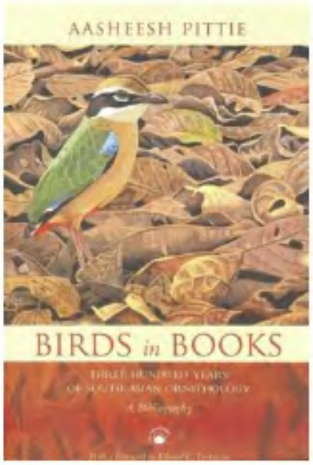

Birds in Books: Three Hundred Years of South Asian Ornithology – A Bibliography. Aasheesh Pittie. Permanent Black, 'Himalayan', Mall Road, Ranikhet Contt, Ranikhet 263 645. 2010. xxi + 845 pp. Price: Rs 795.

Birds belong to the second most diverse class of vertebrate animals. The nine thousand species of extant birds are spread across continents in a way that there is practically no place on earth without birds. The great range of sizes, shapes, colours, calls and habits of birds have undoubtedly made them the most fascinating of animals.

Human fascination for birds is age old. Traditionally, people adorned themselves with feathers, performed ritualistic bird dances, caged some as pets, domesticated others like the chicken, duck, turkey and pigeon and also carried them far and wide. The long time human–bird association has not only influenced culture but also science and technology. Interestingly, despite the great strides that ornithology has made as a specialized branch of animal sciences, it continues to accommodate amateur wisdom. Major contributions to the study of birds have come from bird watchers not trained in animal sciences. The book under review is an excellent example of how amateur ornithology can complement serious and dedicated scientific research.

Birds in Books by Aasheesh Pittie is indeed an 'eye-opener' to the wealth of publications in the field of South Asian ornithology. The author has meticulously compiled titles of 1715 books on birds of South Asia published during the past 300 years. For every book that he has collected or seen, he has written brief abstracts of the contents and the quality of presentation. The timeline of books dealt with span a period between 1713 and 2009 (pp. xviii–xxi).

Eighteenth century authors listed are John Ray, George Edwards, Carl von Linné (Linnaeus), Thomas Pennant, Johann Reinhold Forster, P. Sonnerat, J. F. Gmelin, John Latham and David Hugh, some of whom I know only by their Latinized names incorporated in the binomials of birds (for example, *Gallus sonneratii*, the Grey Jungle Fowl). Names of more familiar ornithologists begin to appear in the 19th century literature; John Gould, A. O. Hume, T. C. Jerdon and E. W. Oates, for instance. South Asian ornithology got its greatest boost in the 20th century with the arrival of stalwarts like Salim Ali that it is only appropriate that this 'greatest-of-all' Indian ornithologist's contribution, by way of books alone, covers 44 pages of Pittie's compilation (pp. 36–79). The cover is well-designed. The solitary Indian Pitta portrayed on the jacket quite symbolizes a curious student!

While Pittie's compilation has certainly made finding reference books simpler for students of South Asian ornithology, it is not without omissions, some of which in my opinion are quite blatant. Given the freedom that a reviewer enjoys, I wish to first draw the readers' attention to the gaps in the regional language ornithological publications included in the book and the evident bias in favour of the more publicized titles. The book lists K. K. Neelakantan's *Keralathile Pakshikal*, a book relentlessly publicized as 'the' landmark regional language ornithological treatise. The book also includes the Kannada language *Field Guide to the Birds of Dakshina Kannada* by K. Prabhakar Achar and K. Geetha Nayak published by the Bhuvanendra Nature Club in 2000. The Kannada field guide to birds, although not as highly rated as Neelakantan's Malayalam book, did attract considerable publicity as it was released by Madhav Gadgil in the presence of ornithologists like S. A. Hussain. I even remember having reviewed the book for *Resonance*.

The more recent series of regional language translations of the bird guides by Richard Grimmett and colleagues do find a place in the bibliography section of the book. Is there no other meritorious regional language book on Indian birds? Of the handful that I am aware of, V. M. Tiwari's well-illustrated book titled *Joy*