

Determining Correct Names of *Nesphostylis bracteata* (Fabaceae) and *Avena sterilis* subsp. *ludoviciana* (Poaceae): Cautionary Lessons in the use of Digital Taxonomic Databases

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Manuscript received on 26 October, 2022; accepted on 20 June, 2023

ABSTRACT

Botanical names, linking resources and source data across databases, are central to digital resources. They aid in integrating taxonomic research, reports of systematic study and botanical reviews. Databases such as POWO (Plants of the World Online) and GBIF (Global Biodiversity Information Facility) enable researchers to ensure that they use the latest accepted names in their publications. However, it is important to pay heed to inconsistencies between databases. This study highlights the need for botanists and non-taxonomists to re-check and confirm the correctness of plant names provided in general databases before reporting research results. We found two name changes in wild taxa related to crop plants in India that required updating (1) the endemic legume of northern parts of Western Ghats, *Nesphostylis bracteata* (Baker) D. Potter & J.J. Doyle that was incorrectly synonymized with the crop taxon, *Lablab purpureus* subsp. *benghalensis* (Jacq.) Verdc., and (2) a weedy relative of *Avena*, *A. sterilis* subsp. *ludoviciana* (Durieu) Nyman with confusion in author names. We adopted used information available in open taxonomic databases to check and correct nomenclature. Additional floristic accounts of native diversity and results from systematic studies helped to clarify the status of the taxa vis-à-vis their taxonomy. Experts in nomenclature helped to resolve the errors and to incorporate the changes into the taxonomic databases. The implications of the name changes were different; in the case of *N. bracteata*, the name changes restored the endemic status of a species of the Western Ghats, a major hot-spot of diversity in the Indian region. In case of *A. sterilis* subsp. *ludoviciana* it served to clarify the correct nomenclature of the common temperate weedy species of the north- western region.

Key words: *Avena*, *Lablab*, *Nesphostylis*, nomenclature, taxonomic databases, wild taxa, wild relative

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Introduction

Botanical names, linking resources and source data across databases, are central to digital resources integrating aids for taxonomic research, reports of systematic study and botanical reviews. Though regularly updated in the light of new research and errors rectified, they, however, represent ‘a historic source of information rather than a clue to the flora of the world’ (Rafaël Govaerts, pers. comm.); that is, links to original literature and subsequent works citing the taxon, are a clue for further study, rather than aids to delineation of taxon limits and their identification. As such, they are invaluable as sources of information on the original literature pertaining to nomenclatural changes, namely, synonyms, protologues (author names and details of original publication) and archival taxonomic works. Besides ensuring that the latest accepted names are reported in research publications, it is important to

check the sources also to determine the significance of the name change in the context of native diversity. The late M.P. Nayar, ex Director, BSI (Botanical Survey of India) advised that “accepting name changes in plants without checking them in the context of related taxa and use of the diversity was not good taxonomic practice” (pers. comm.). The two nomenclatural case studies presented here follow this dictum.

The nomenclatural revisions presented here represent part of our work on updating the priority list of 327 wild relatives of crop plants previously delineated for the Indian region (Arora & Nayar, 1984). This work served as a basis for working out collection programmes and conservation strategies in plant genetic resources. While updating the nomenclature of these species, name changes over the past four decades were recorded in 91 taxa, both at the level of the genus and species. These included mostly species

belonging to crop genera, but some related genera too were included. Errors were noted in two taxa, namely 1) the wild endemic legume of Indian subcontinent, *Nesphostylis bracteata* (Baker) D. Potter & J.J. Doyle, which was wrongly named *Dolichos bracteatus* Baker and variably included in the crop *Dolichos*, renamed *Lablab* (common names, Hyacinth bean and Sem in English and Hindi, respectively) and *Macrotyloma* (common names, Horsegram and Kulthi); 2) the weedy graminaceous species, *Avena sterilis* subsp. *ludoviciana* (Durieu) Nyman of the north western parts of the Indian subcontinent, which had been named *Avena ludoviciana* Durieu, later revised and considered a subspecies of *Avena sterilis* L. This error was due to confusion in determining the correct protologue. Resolving these two errors required the help of nomenclatural experts to sort out problems before finally incorporating corrections into publicly available databases. We use these two instances as a way to alert botanists in general about the caution needed in using the undoubtedly valuable online databases.

Methods

The procedures adopted pertain, by and large, to use of digital databases, along with taxonomic literature and original publications, and were common to all taxa taken up for nomenclatural checks. Listed below are the digital resources used, and the specific aspects that helped to identify and clarify the anomalies noted in two taxa belonging to *Nesphostyles* (Leguminosae/Fabaceae) and *Avena* (Poaceae).

Digital databases (Data providers, data collators and analysers, and guides):

Plants of the World Online (POWO) and Global Biodiversity Information Facility (GBIF) present accepted names of plants, along with cross-links to synonyms and specimens. These represent the end result of data collation and analysis through WCVF (World Checklist of Vascular Plants); WFO (World Flora Online) and its precursors, and The Plant List (1st and 2nd version).

International Plant Names Index (IPNI; and APNI, Australian Plant Names Index, a collaborator), provide standardised data on taxon names and their protologues. It provides links to authors of plant names through Taxonomic Literature (TL), original taxonomic publications available at Biodiversity Heritage Library (BHL), as well as links to taxonomic data (synonymy and native distribution) through POWO.

Tropicos (<https://www.tropicos.org/home>), database of the Missouri Botanic Gardens (MBG), links botanical names to plant specimens and images, as well as references to publications, especially those of their e-flora projects. MBG are collaborators in the preparation of two of the e-floras of the Asian region (a) Flora of China and (b) Flora of Pakistan (eFloras, 2008).

Digital resources of original publications:

Taxonomic Literature (Stafleu and Cowan, 1981) is available as print volumes and as databases at <https://www.sil.si.edu/DigitalCollections/tl-2/browse.cfm?vol=15#page/232>, and as print volumes at Biodiversity Heritage Library (BHL). The latter is by far the best resource for access to much of the original taxonomic literature quoted in protologues of taxonomic names. Other resources include Gallica (gallica@bnf.fr), focusing on documents of French origin, with worldwide impact.

Nomenclatural experts and specialists: These experts oversee the process of providing access to the taxonomic data in various databases and publications. In the present context, consulting the experts helped in interpretation of taxonomic data especially in *Novelle Flore Francaise* (1873) in French, and notations in *Conspectus Florae Europaeae* (1882) in Latin.

Results

The results from using the taxonomic sources for detecting errors in *Nesphostylis* and *Avena* and resolving their nomenclature are as follows:

IPNI served as a primary resource for validating all recorded botanical names, both accepted ones and past synonyms under *Dolichos* L., *Sphenostylis* E. Mey., *Nesphostylis* Verdc. and *Lablab* Adans., as well as *Avena* L.

Both databases, POWO and GBIF, represented *Nesphostylis bracteata* as a synonym of the crop taxon, *Lablab purpureus* subsp. *benghalensis*. However, this species is a naturally occurring endemic species of northern Western Ghats (Baker, 1876; Cooke, 1903), and therefore distinct from the crop taxon. Original taxonomic records and type material listed under both, the wild taxon (*Dolichos bracteatus* L.) and the crop taxon (*Lablab purpureus* subsp. *benghalensis*), provided the starting point for checking out this anomaly of synonymising a wild taxon with a crop taxon (Fig. 1). No references pertaining to *Nesphostylis* were found in the bibliography of *Lablab purpureus* subsp. *benghalensis*



Figure 1. Type specimens of *Nesphostylis bracteata* and *Lablab purpureus* subsp. *benghalensis*. (A) *Dolichos bengalensis* Jacq., Hort. Bot. Vindob. 2: 57; t. 124 (1772); (B) *Nesphostylis bracteata* (Baker) D. Potter & J.J. Doyle (<http://specimens.kew.org/herbarium/K000900649>); (C) *Dolichos bracteatus* Baker, DP Panthaki, DP1483, 6.8.1954, ex Blatter Herbarium, (courtesy: R. Shinde, St. Xavier's College, Mumbai).

on the POWO site, even though the specimen in the database was an isotype of *Nesphostylis bracteata* (K000900649, RBG, Kew), authenticated by Potter (on 2/1/1992; Fig. 1A).

In the case of *Avena sterilis* subsp. *ludoviciana* (Fig. 2), the author names cited in the two databases, POWO and GBIF were different. Both protologues had based their taxon on the same basionym - *Avena ludoviciana* (described by Durieu, 1855 from the Mediterranean region). Tropicos showed a modified protologue, *Avena sterilis* subsp. *ludoviciana* (Durieu) J.M. Gillett & Magne, which compounded the confusion. Though in general a valuable source of data for nomenclature, Tropicos did not aid in working out the correct protologue of *A. sterilis* var. *ludoviciana*.

We checked the original publications mentioned in the protologues to determine the status of *A. sterilis* and that of *ludoviciana* within it (Fig. 2A).

Novelle Flore Francaise, cited in one of the protologues of *A. sterilis* subsp. *ludoviciana*, was listed

as having run through eight editions through the period 1862-1903 (TL 2/3 Volume 3 under Magne, p. 241, No. 5222); Gillet, C.C. was wrongly listed as the co-author, an error that was rectified in Supplement 8 (p. 219), showing Gillet as the first author (Fig. 2B).

Original literature pertaining to *Nesphostylis*, and *Avena* were available at BHL with the exception of the publication quoted in the protologue of *A. sterilis* subsp. *ludoviciana* (Durieu) Gillet & Magne; 3rd Edition of *Novelle Flore Francaise*, by Gillet and Magne (1873), which was available only at Gallica (gallica@bnf.fr), a digital resource for publications focusing on documents, with worldwide impact, of French origin (Fig. 2C).

While mistakes and misrepresentations in the two taxa were resolved on the basis of the above listed data sources and publications, help was sought from experts, and this helped in sorting out the problem. K. N. Gandhi (Harvard University Herbaria, USA) proved to be of invaluable help in resourcing the correct literature (Fig. 2A, 2B and 2C) and its interpretation in the case

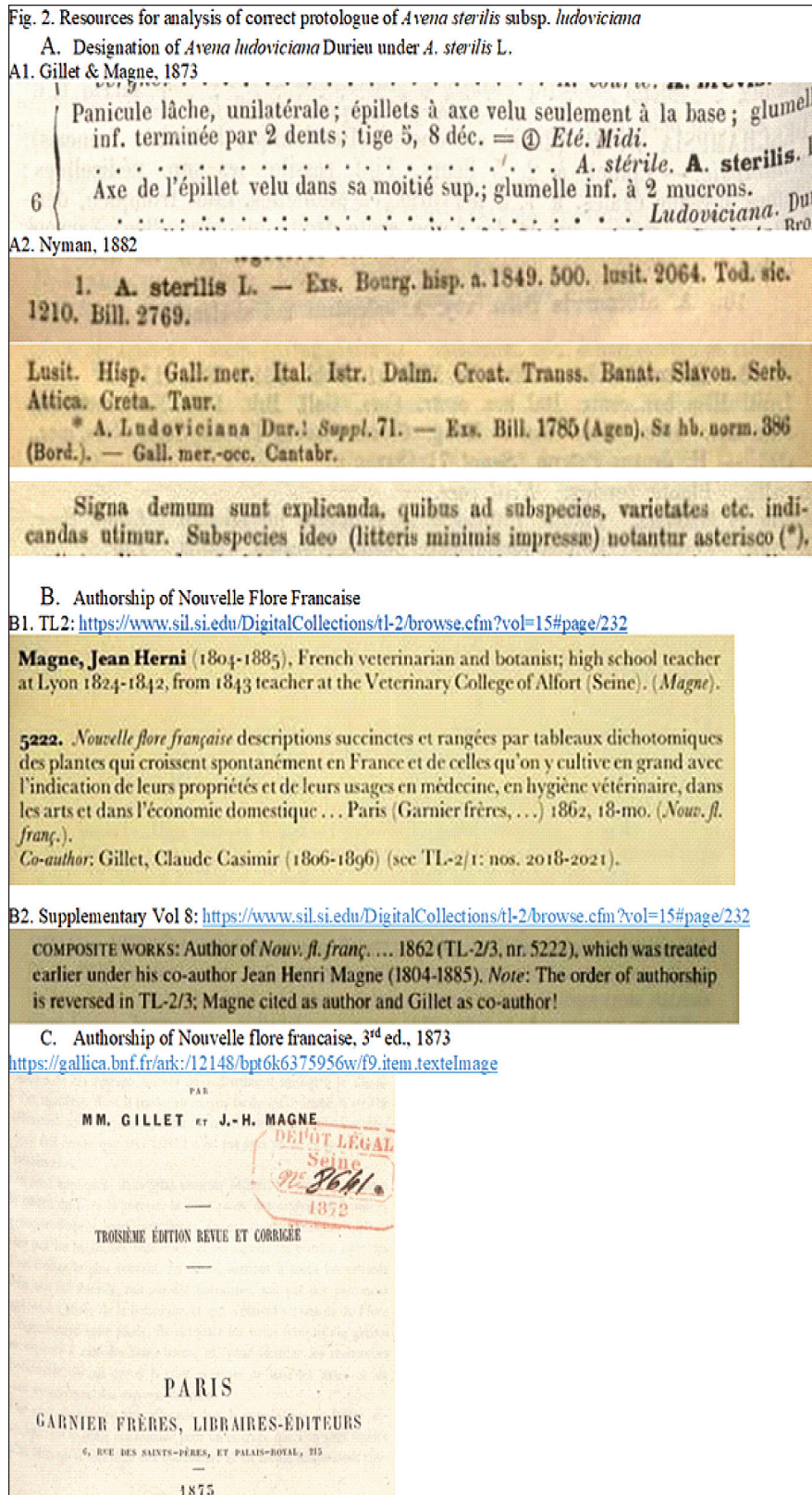


Figure 2. Resources for analysis of correct protologue of *Avena sterilis* subsp. *ludoviciana*. (A) Designation of *Avena ludoviciana* Durieu under *A. sterilis* L. (A1) As given by Gillet & Magne, 1873; (A2) As given by Nyman, 1882; (B) Authorship of Nouvelle Flore Francaise, 1862-1903 (B1) Taxonomic Literature (TL) 2; (B2) Supplementary volume 8; (C) Authorship of Nouvelle Flore Francaise, 3rd ed., 1873.

of *A. sterilis* subsp. *ludoviciana*; R. Govaerts (Royal Botanic Gardens, Kew) helped us with the queries relating to *N. bracteata*. In both cases, the corrections were approved and accepted for incorporation into IPNI/APNI and POWO, respectively.

Correct nomenclature, worked out using the approaches indicated above, and discussion of the problems that were encountered, are given below (correct and accepted name in bold, followed by synonyms).

Nesphostylis bracteata (Baker) D. Potter & J.J. Doyle: independent status of taxon vis-à-vis *Lablab purpureus* subsp. *benghalensis* (Jacq.) Verdc. (Fig. 1).

Nesphostylis bracteata (Baker) D. Potter & J. J. Doyle, Syst. Bot. 19(3): 401 (1994); *Sphenostylis bracteata* (Baker) J. B. Gillett, Kew Bull. 20(1): 103 (1966); *Dolichos ghaticus* Santapau & Panthaki, J. Bombay Nat. Hist. Soc. 53: 502 (1956); *Dolichos bracteatus* Baker, Fl. Brit. India 2: 210 (1876) [Basionym]; *Lablab bracteatus* Benth. (MS. ined., i.e., unpublished as indicated by Potter and Doyle, 1994).

Nesphostylis bracteata (Baker) D. Potter & J.J. Doyle was described and reported to be a legume endemic to northern Western Ghats, based on specimens collected by Stocks, from 'Konkan' and referred to as *Lablab bracteatus* Benth. (nom. ined.) on the holotype and isotypes available in Herb. Stocks, at Royal Botanic Gardens, Kew and Natural History Museum, British Museum, UK; as *Dolichos bracteatus* by Baker (1876); listed by Woodrow (1897); and considered 'a very rare' taxon by Cooke (1903). However, this taxon was said to be commonly found and locally used and was renamed *D. ghaticus* by Santapau and Panthaki (1955). This was corroborated by records of Blatter Herbarium (Fig. 1B represents one of over thirty specimens provided for study by Dr. Rajendra Shinde). It was considered to be 'probably extinct' by Potter and Doyle (1994), who appear to have missed the study of Santapau and Panthaki (1955).

Nesphostylis bracteata, was reduced to a synonym under the crop species *Lablab purpureus* subsp. *benghalensis* (GBIF and POWO). A probable reason for the merger of the endemic wild locally used taxon with the crop taxon may have been the misinterpretation of data in the treatise on the plant wealth of India (Wealth of India, 1952, which was shown as source for this information in Mansfeld's World Database (Hanelt,

2017). The taxon, *Dolichos bracteatus*, was indicated in this database as wild in the 'Indian peninsula' and 'sporadically grown in gardens for edible young pods and leaves (and including both pole and bush forms)'. In fact, however, Wealth of India (1952) gives details for the cultivated taxon, including pole and bush forms under *Dolichos lablab* L. and, for wild taxa, appended a brief paragraph; among these, *D. bracteatus* was noted as 'occurring in Konkan and high elevations of Bombay' and with seeds that were used as food.

Delineation of the taxon, *Nesphostylis*, as separate from other genera of tribe Phaseoleae, was the result of floristic and systematic study undertaken over five decades mainly on diversity within the African region (Gillett, 1966; Verdcourt, 1970; Potter and Doyle, 1994). *Nesphostylis* Verdc. and *Sphenostylis* E. Mey. were closely related taxa sharing a cuneate dorsiventrally flattened style, a feature that did not occur in any other genus in the tribe Phaseoleae, subtribe Phaseolinae (Verdcourt, 1970).

Nesphostylis bracteata, besides being endemic to northern Western Ghats, is a taxon of uncertain taxonomy. It was shifted from *Dolichos* L. to *Sphenostylis* E. Mey., and then to the later erected genus *Nesphostylis*. According to Potter and Doyle (1994), *Nesphostylis* comprises three species - one each in tropical Africa (*N. holosericea* (Baker) Verdc., Verdcourt, 1970), India (*N. bracteata*), and Myanmar/ Burma [*N. lanceolata* (Grah. ex Baker) H. Ohashi & Tateishi, rare and probably not recollected recently]. Material and information in Santapau & Panthaki (1955) apparently had been missed when the species was assigned, first to *Sphenostylis* (Gillett, 1966) and later to *Nesphostylis*, based on cladistic analysis of morphological characters and cpDNA (Potter & Doyle, 1994).

Lablab purpureus subsp. *benghalensis* (Jacq.) Verdc., Kew Bull. 24(3): 411 (1970); *Dolichos benghalensis* Jacq., Hort. Bot. Vindob. 2: 57 (1772); *Lablab benghalensis* (Jacq.) Medik., Philos. Bot. 1: 205 (1789)

As per the analysis by Verdcourt (1970), *Lablab purpureus* subsp. *benghalensis* (Jacq.) Verdc., based on descriptions and figure of a plant from West Bengal in Jacquin (1772), was also recorded in Kenya. *Lablab purpureus* and its subspecies were described, based on characters of the plant, flower and its bract, pod and seed (Fig. 1C). The distinctive style features were only described when *Sphenostylis* and then *Nesphostylis* were delineated and described.

The misinterpretation of *Nesphostylis bracteata* as *Lablab*, and nomenclatural changes in the taxon over the past 120 years was analyzed and submitted to Dr. R. Govaerts. As per his latest communication dated 8 September, 2022, *Nesphostylis bracteata* (Baker) D. Potter & J.J. Doyle was ‘accepted... and this will be on the next POWO refresh.’

Avena L., Sp. Pl. 1, 79. 1753 [Poaceae]: status of *ludoviciana* under *A. sterilis* L.

Avena sterilis subsp. *ludoviciana* (Durieu) Nyman, Consp. Fl. Eur. 810. 1882; *Avena sterilis* subsp. *ludoviciana* (Durieu) Gillet & Magne, Nouv. Fl. Franc., ed. 3, 526, 1873; *Avena ludoviciana* Durieu, Act. Soc. Linn. Bordeaux, 20: 41, 1855 [Basionym].

Taxonomy: There were differences in the name of the author in different databases and e-floras. *A. sterilis* subsp. *ludoviciana* (Durieu) Nyman, Consp. Fl. Eur. 810. 1882 was accepted in POWO and e-flora of China; but *Avena sterilis* subsp. *ludoviciana* (Durieu) Gillet & Magne, Nouv. Fl. Franc., ed. 3, 526, 1873 was accepted in GBIF and e-flora of Pakistan.

Perusal of literature associated with different data collators and data providers indicated that there were two issues that needed to be resolved: one, the correct author of *A. sterilis* subsp. *ludoviciana* and, second, the correct protologue of *Avena sterilis* subsp. *ludoviciana* (Durieu) Gillet & Magne.

Gillet & Magne (1873) indicated that *ludoviciana* was to be included under *A. sterilis*, but they did not assign the category (Fig. 2A1). Nyman (1882) assigned it to the subspecies category, but this had been missed by later workers; it was indicated at the end of the preface, as was the practice in older floristic works (Fig. 2A2). The accepted name therefore is *A. sterilis* L. subsp. *ludoviciana* (Durieu) Nyman, Consp. Fl. Eur. 810. 1882; hence *Avena sterilis* subsp. *ludoviciana* (Durieu) Gillet & Magne is a synonym. @roshinienayar1@gmail.com

Correct protologue of *A. sterilis* subsp. *ludoviciana* (Durieu) Gillet & Magne (Fig. 2): The names of the two authors, Gillet and Magne were incorrectly indicated, with Gillet as the second author in Staffeu and Cowan (1981, No. 5222), which was corrected in Dorr and Nicolson (2009). The original publication (3rd ed. of Nouvelle Flore Francaise) indicated M.M. Gillet and J.M. Magne as the authors (Fig. 2C); M.M. was for ‘Messers’ (singular, ‘Monsieur’ in French publications); it did not include the initials of the first author, Claude

Casimir Gillet although those of the second author, Jean- Henri Magne, were included) (<https://gallica.bnf.fr/ark:/12148/bpt6k6375956w/f9.item.texteImage>). This contributed to the confusion on the MBG site.

K.N. Gandhi helped to resolve the problem. The author entry for Gillet in APNI was edited to reflect the fact that it refers to C.C. Gillet, and the name entry was edited by treating the name in Gillet & Magne’s publication as *Avena sterilis* [unranked] *ludoviciana* (Durieu) Gillet & Magne (<https://id.biodiversity.org.au/name/apni/114900>).

Despite differences in the nature of misrepresentations noted in the two taxa in the open- access databases, the procedure for checking and ensuring correctness of the plant names was, by and large, similar. The following points provide a few common features for analysis and interpretation of information provided in databases and literature:

Differences in plant names used across open databases are indicative of an error that needs to be checked out.

Nomenclatural errors in plant names, when they occur, can get compounded, unless checked out with the original publication.

Compilations, in contrast to floristic study based on study of specimens and plants in the field, are likely to be one source of perpetuation of inadvertently introduced errors.

It is a good taxonomic practice to check the specimens too, using links available on the taxonomic databases, and follow the dictum indicated by Bentham (1884) regarding work on Genera Plantarum “*our characters have been drawn up from the actual examination of specimens*” except where there is “*special indication to the contrary.*”

Check all recorded synonyms especially in its native area to ensure that no important aspect pertaining to the description, delineation or use are missed.

Open access databases, which we used to solve the problems and issues in *Avena* and *Nesphostylis*, provide clear guidelines on the limitations or time span of taxonomic data included and updated, adding to their value as a resource for checking nomenclature.

Adopting the practice of cross-checking reasons for name changes of plants, had wider repercussions in *Nesphostylis bracteata*. The mistake of merger of a wild taxon with the crop species impacted the status

of an endemic occurring in a hot-spot area of diversity in the Indian region, that probably under threat as it had been collected only as herbarium specimens and was not known to be conserved as seed germplasm.

Further study of the systematics and phylogeny including *N. bracteata*, and related taxa belonging to *Sphenostylis*, *Macrotyloma* and *Lablab*, are needed. Though majority of the genera were primarily African in diversity build-up, the relationship of *N. bracteata*, purported to be basal to other species, based on study of ‘type’ material only (Potter and Doyle, 1994), needs to be confirmed using later collections, currently represented by herbarium specimens.

Acknowledgements

The senior author thanks Kanchi N. Gandhi, Harvard University Herbaria & Libraries, Cambridge, MA, USA for his guidance in understanding nuances of expression in old French language publications, checking aids to nomenclature viz. TL, and in the application of the rules of infraspecific nomenclature vis-à-vis *Avena sterilis* subsp. *ludoviciana* [in consultation with European counterparts, W. Grueter (Editorial Committee of the Melbourne Code, 2012)] and finally getting the changes incorporated into APNI; R. Govaerts, Biodiversity Informatics & Spatial Analysis, Royal Botanic Gardens, Kew, for checking out all evidences provided to him and restoring the species status of the wild endemic taxon, *Nesphostylis bracteata* in the digital database; R. Shinde, St. Xavier’s College and Director, Blatter Herbarium, Mumbai; and to Dr. Prithipalsingh, ex-Kirori Mal College, University of Delhi. Thanks are due to ICAR (Indian Council of Agricultural Research) and ICAR- NBPGR (National Bureau of Plant Genetic Resources) as this is an extension of work undertaken under the ICAR-Emeritus Scientist project awarded to the senior author.

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