

Comparative evaluation of research in IISc, IITs, NUS and NTU using CWTS Leiden Ranking 2017 data

Earlier in these pages we have shown that the research performance of the Indian Institutes of Technology (IITs) in engineering using Web of Science (WoS) and Scopus bibliometric databases has not kept pace with that of the more developed countries in the world¹. Two premier Singapore institutions, namely the National University of Singapore (NUS) and Nanyang Technological University (NTU) outperform all the seven premier IITs taken together. Later, a three-dimensional framework in terms of size, excellence and diversity of the research base of the premier institutes in India and Singapore confirmed that a cluster comprising Indian Institute of Science (IISc) and the seven IITs at Kharagpur, Kanpur, Delhi, Chennai, Mumbai, Roorkee and Guwahati (which we collectively call IISc + 7 IITs) was handsomely outperformed by Singapore, again represented by NUS and NTU².

The Centre for Science and Technology Studies (CWTS) Leiden Ranking 2017 which has just been released offers key bibliometric data which allow comparative evaluation of the scientific performance of over 900 major universities worldwide. Now there are 20 institutions from India (of which the IISc + 7 IITs cluster finds place individually in the top 13 ranks). This will mean that 2.2% of the top higher education institutions (HEIs) in the world are based in India; less than the country's share of the nominal world GDP (approximately 3.2%). NUS and NTU are the only institutions from Singapore that make the cut. We use these data to review how the Indian cluster compares with the Singaporean HEIs.

We follow the same methodology that was reported earlier in these pages³. CWTS Leiden Ranking 2017 (<http://www.leidenranking.com/>) is based exclusively on the WoS database (Clarivate Analytics, Philadelphia, USA) and covers 902 universities from 54 different countries. All universities worldwide with more than 1000 fractionally counted, WoS-indexed core publications in the period 2012–15 are included in the ranking.

In a typical assessment window (say, 2012–15), an institution will have pub-

lished a total number of papers or articles, P (fractionally counted), and received a total number of citations, C . P can be taken as the indicator or proxy

measure for the size of the unit and C is the total impact of its published research respectively. Over the years, CWTS has found that the proportion of top 10%

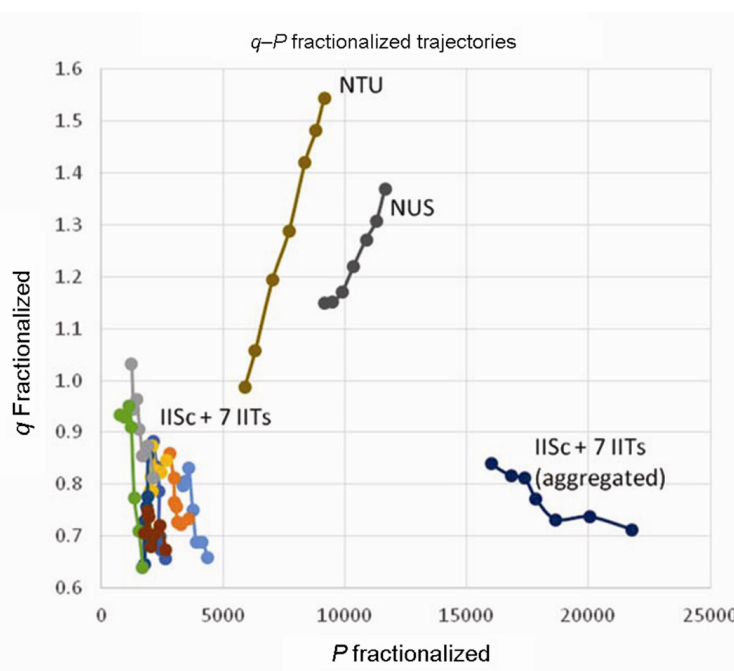


Figure 1. The performance of IISc + 7 IITs cluster is compared with that of NUS and NTU as we move from the 2006–09 to 2012–15 window. The aggregated output of the Indian cluster is twice more than that of NUS or NTU. However, on the quality proxy, NUS and NTU perform much higher than the global norm, while the Indian cluster is below global norm and is in gradual decline over the years.

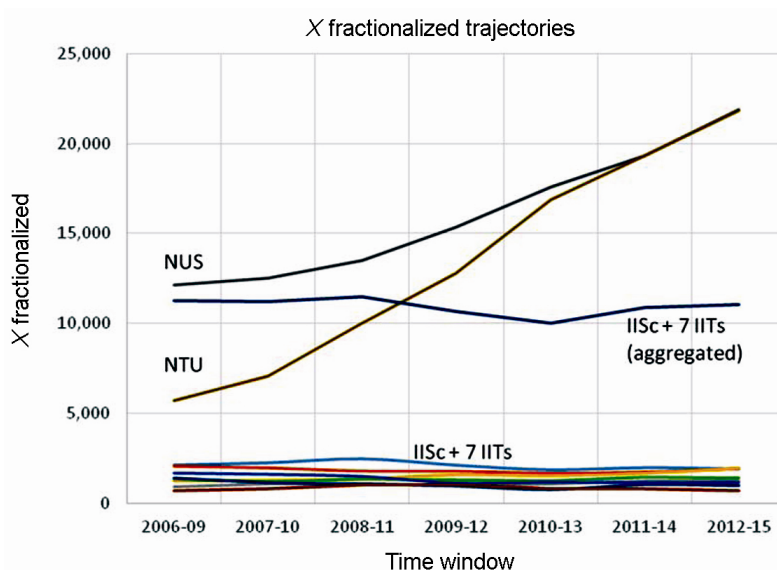


Figure 2. The composite effect is clearly seen when the second-order indicator is displayed – NUS and NTU far outperform the Indian cluster.

publications, PP (top 10%) is arguably the most robust, size-independent proxy or indicator for quality of publications. This is the proportion of the publications of a university that, compared with other similar publications, belongs to the top 10% most frequently cited. It therefore has a normalizing effect across fields, publication year and document type. The ratio $q = \text{PP (top 10\%)/10}$, allows one to fractionalize this proxy, such that a value of 1.00 is the expected global norm.

If we consider q to be the quality indicator and P to be the zeroth-order indicator of performance, then it is possible to combine this to obtain a first-order indicator of performance qP and a second-order indicator of performance $X = q^2P$ (ref. 4). In this manner, the quantity term (P) and the quality term (q) can be integrated into a single composite term that serves as the best size-dependent proxy for total performance in the research context.

Figures 1 and 2 compare the performance of the IISc + 7 IITs cluster with that of NUS and NTU as we move from the 2006–09 to the 2012–15 window. From Figure 1 it is clear that the aggregated output of the Indian cluster is twice as that of NUS or NTU. However, on the quality proxy, NUS and NTU perform much higher than the global norm, while the Indian cluster is below global norm, and is in gradual decline over the years. The overall effect is clearly seen when the second-order indicator is displayed in Figure 2 – NUS and NTU far outperform the Indian cluster.

We use the Leiden 2017 data to decompose the research performance of the IISc + 7 IITs cluster and NUS and NTU into two components – size and quality. Not only do NUS and NTU outperform the IISc + 7 IITs cluster, they are also rising steeply in terms of quality of research while the Indian cluster is showing a gradual decline.

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3. Prathap, G., *Curr. Sci.*, 2014, **106**, 1467–1468.
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Impatiens bhimgadensis (Balsaminaceae), a new species from Karnataka, India

The genus *Impatiens* L. (Balsaminaceae) consists of about 210 species in India¹ with 106 species (and 13 varieties) in the Western Ghats². *Impatiens* with over 95% of the species endemic in the Western Ghats, forms one of the primary centres of diversity in India. Recently, several new species from the Western Ghats, viz. *Impatiens minae*³, *I. johnsiana*⁴, *I. theuerkaufiana*⁵, *I. courtallensis*⁶, *I. sahyadrica*⁷, *I. neo-modesta*⁸, *I. sasidharanii* and a variety *hirsuta*⁹, *I. glabrata*¹⁰, *I. kawtlyana*, *I. taimushkulni*, *I. nilgirica* var. *nawtlyana*¹¹, *I. stolonifera*¹², and *I. mankulamensis* and *I. panduranganii*¹³ have been discovered.

During the floristic explorations by the authors in Talewadi, Bhimgad Wildlife Sanctuary, Belagavi district, Karnataka, during September 2014, an interesting species of *Impatiens* belonging to the Section: ‘Annuae’ was collected, which is found to be new to science, and the same is described here.

Taxonomy. *Impatiens bhimgadensis* Bhaskar & Sringswara sp. nov.

Impatiens bhimgadensis is distinct from its closely allied *I. rupicola* Hook.

f. and *I. ramosissima* Dalzell in having 3–4 mm long, straight and tapering spur in the lip. Type: India, Karnataka, Belagavi district, Talewadi, Bhimgad Wildlife Sanctuary, alt. 800 m 20.09.2014, V. Bhaskar & A.N. Sringswara 934 (holo, UASB!) (Figure 1).

Erect glabrous flaccid herbs, up to c. 50 cm high, often rooted at lower nodes; stems highly branched from the middle, terete, often with a vertical groove, glabrous, translucent, vertically spotted with red hydropetan cells, lower internodes 4–6 cm long. Leaves opposite–decussate, exstipulate, sessile or with c. 2 mm long petiole, lamina ovate, lanceolate, c. 3 × 1.4–1.5 cm, round or slightly cordate at base, obtuse or acute at apex, serrate, each serrature denticulate, upper leaves broad at base, auricled, sparsely hairy on veins above, hairs upwardly erect, glabrous below, eglandular. Flowers axillary, solitary, 1–1.25 cm across, pinkish or bluish, with a pair of purple streak on the inner sides of wing petals continuing with perpendicular honey guides of the same colour, pedicels erect, 3–3.5 cm long in flower and deflexed

and c. 4 cm in fruit, erect in flower, deflexed in fruit, minutely pubescent with two lines of hairs. Lateral sepals two, linear, acute, almost as long as standard, smaller than wings, c. 5 × 0.75 mm, glabrous, pale pink. Lip funnel-shaped, mouth c. 5 mm long, distal end acute or acuminate, proximal part three-nerved, a small yellow ‘eye’ present inside, purplish honey guides visible outside and inside, generally light pink, usually glabrous, rarely with a few scattered hairs, base narrowed down to a short spur, 3–3.4 mm, straight, tapering, tip acute, white or pale green. Standard orbicular, c. 5 × 4 mm, slightly recurved, dorsally keeled, with a prominently enlarged pointed crest at base, crest c. 1.25 × 2 mm, sub-acute, anterior tip mucronate or apiculate, mucro and crest placed at same height, pink, usually glabrous or rarely hirtellous on the keel above. Wing petals two-lobed, distal lobe large, c. 1 cm long from base, broader lobe rhomboidal, c. 8.75 × 6.25 mm, pale pink or bluish, stipe c. 2 mm long, basal lobe small, fin-like, c. 3.75 mm long, distal part broad with two acute opposite ends,