Extraction of *Picrorhiza kurrooa*

Picrorhiza kurrooa Royle ex Benth., commonly referred to as 'kutki' (family Scrophulariaceae), is one of the highly traded medicinal species of great conservation significance. Unscientific and unregulated extraction of *P. kurrooa* is the most pertinent threat to its population. Market demand of kutki is met by wild extraction from the alpine regions (above 3500 m asl) of the Himalaya. The rhizome and root of the plants are believed to be the main constituents of medicinal value and therefore uprooting of the entire plant becomes necessary. Consequently, the recent paper by Singh *et al.*[1] that analyses the picrosides content (active compounds) in the leaves, roots and rhizomes of kutki, highlights the importance of kutki leaves as a possible alternate to its underground parts. This has great conservation implications.

During our field studies in the western Himalaya[2–4], we have observed rampant uprooting of *P. kurrooa* for trade. Owing to its high market demand, kutki collection and trade has become an important economic activity in many interior areas of the Himalaya, such as the Dhauladhar. People have now started camping in the alpine areas, from May–June to September–October, solely for its collection. They live in inhospitable conditions primarily under rocks or tarpaulin tents. During their 4–5 months stay, the collectors take a break of 20 days at different times, wherein the collected plant material is transported on their back to the villages and a fresh stock of ration is fetched to their camping sites. We recorded that a collector spends almost 10 h a day searching and collecting *P. kurrooa*. Every single kutki plant is uprooted and the collector returns in the evening with around 5 kg fresh weight of the plant material. Around 300–400 plants (flowering shoots) are uprooted to make 1 kg dry weight of *P. kurrooa*. As a part of the routine, the collected material is cleaned and all the leaves of *P. kurrooa* are removed and thrown away (Figure 1). The leaves are presumed to be the unwanted part and often the traders reject the material that has leaves. In fact, the collectors spend a lot of time removing the leaves, which can be seen littered around their camps. Singh *et al.*[1] have provided valuable insights and perhaps a new beginning in the management and conservation of *P. kurrooa*.

Figure 1. Collectors cleaning the collected *Picrorhiza kurrooa*. In the process, all the leaves are removed and discarded.

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ANJALI UNIYAL[1,*]
GOPAL S. RAWAT[1]
SANJAY KR. UNIYAL[2]

[1]*Department of Habitat Ecology, Wildlife Institute of India, P.B. No. 18, Chandrabani, Dehradun 248 001, India*
[2]*Biodiversity Division, Institute of Himalayan Bioresource Technology (CSIR), P.B. No. 6, Palampur 176 061, India*
**e-mail: anjalincv@yahoo.co.in*

The rapid increase of China's average research impact

During the first decade of this century, China has become the second largest economy in the world, and its science has also made tremendous progress. Nevertheless, there is much criticism regarding the situation in China, both at home and overseas. It is believed that Chinese scientists publish more papers with low impact by the incitation of incentive and evaluation system[1], and despite a rise in the total output of Chinese science papers, the average impact continues to be low. Is this really so?

Citations per paper (CPP) is an index generally used to measure the average impact of research[2–4]. This indicator is the sum of citations divided by the sum of papers. However, CPP has comparability only when the scales of total papers are similar. For example, in the latest Essential Science Indicators (ESI) data (http://esi.isiknowledge.com/home.cgi; updated as of 1 March 2011 to cover the 11-yr period, i.e. 1 January 2000–31 December 2010), Bermuda, whose sum of papers in 11 years is 253 (CPP = 23.29), and Panama, whose sum of papers is 1898 (CPP = 17.76), were ranked first and second in CPP of 146 countries or territories. Therefore, the average impact of papers from the big countries should not be ranked and compared with small countries.

Figure 1 shows CPP data of the G7 countries and BRIC countries during 2000–2010 from the ESI database (http://esi.isiknowledge.com/home.cgi, 2011). In general, CPP of the BRIC countries is lower than that of the G7 countries. Although CPP of China since this century

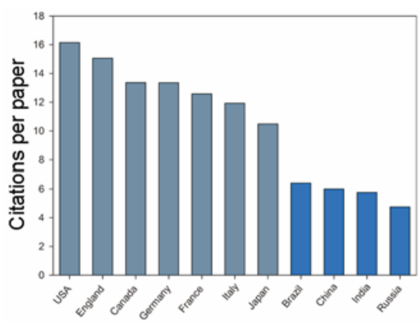

Figure 1. Citations per paper (CPP) of G7 and BRIC countries.

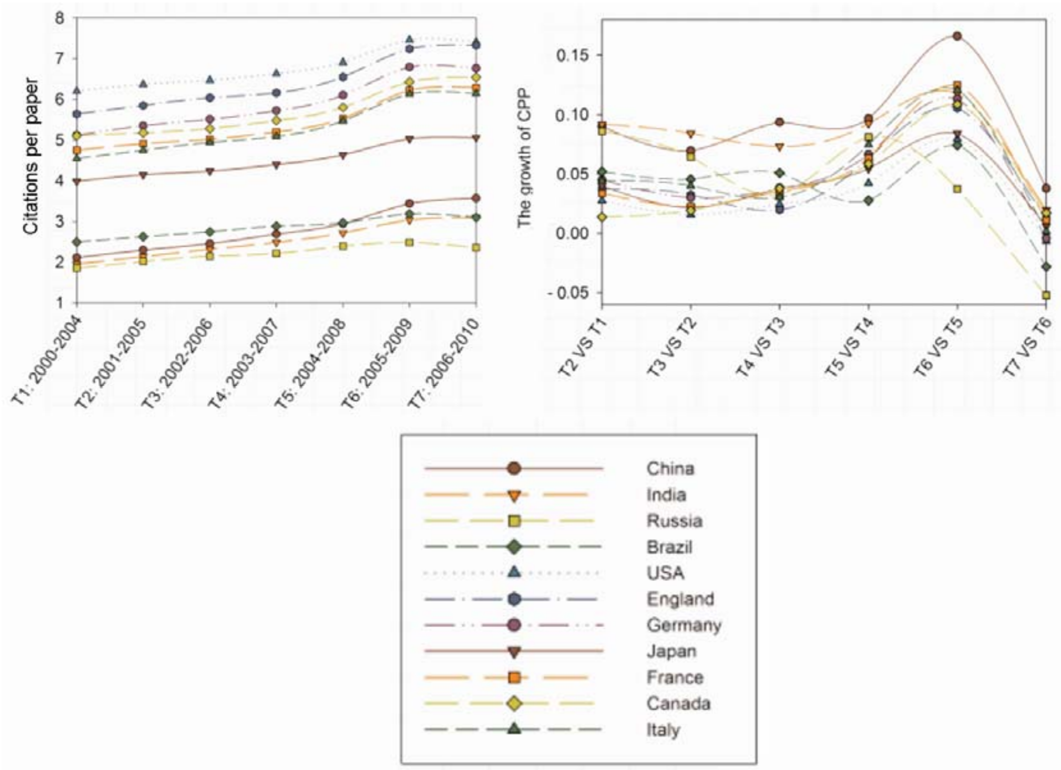

Figure 2. Growth rate of CPP for the G7 and BRIC countries.

is much lower than that of the G7 countries, it has been higher than that of India and Russia.

Figure 2 is a tendency chart in chronological order. From around 2005, CPP of China has surpassed that of Brazil, and China has been at the top in the BRIC countries. Since 2003, the rate of CPP growth in China has been the highest among all G7 and BRIC countries. CPP of China in the T7 period (2006–2010) has been 1.7 times as much as in the T1 period (2000–2004). While in the T1 period, the average CPP of the G7 countries was 2.4 times as much as that of China, a decade later, in the T7 period, China has narrowed down the gap to 1.8. The growth of science in China is largely due to a rapid increase in research and development[5]. The National Natural Science Foundation of China, one of the main basic research funding organization, whose financial investment budget in 2011 will reach about 12 billion RMB, nearly 20% higher than that in 2010.

Thus, although the average impact of Chinese science is still much lower than that of the Western countries, China is making rapid progress.

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STAR X. ZHAO

Department of Information Resource Management,
Zhejiang University,
Hangzhou 310027, China
e-mail: starzhao@zju.edu.cn