to Indian basmati[1]. This case has now been settled for the major issues. Thirdly, protection of interests of basmati growers by the state governments within the country[2] as was experienced in a case filed for registration for protection of basmati grown in Madhya Pradesh under GI tag. And lastly, repeated revisions of the definition of basmati rice have hindered its claim for the GI tag. GI was required to maintain quality and sanctity of the name 'basmati' according to its natural definition. The improved varieties (evolved varieties/cross breeds) such as Basmati CSR 30 and Basmati Pusa 1121 were not named 'basmati' for many years because these could not fulfil the natural definition of basmati. However, the evolved varieties could express quality parameters closer to basmati and captured a lion's share in the global market. The definition of basmati was changed twice to notify them under the name 'basmati'. Presently, seeds of Taroari Basmati (traditional Basmati), Basmati Pusa 1121, Pusa Basmati 1 and Pusa Sugandha-5 (evolved basmati) grown at Indian Agricultural Research Institute (IARI), New Delhi and Directorate of Rice Research (DRR), Hyderabad during *kharif* (rainy season) 2011 and *kharif* 2012 have been analysed for quality parameters: hulling%, milling%, head rice recovery%, kernel length, kernel breadth, length: breadth ratio, volume expansion ratio, water uptake, kernel length elongation after cooking, elongation ratio, alkali spreading value, amylose content and gel consistency. At IARI, only three quality parameters, i.e. kernel length elongation after cooking, elongation ratio and amylose content were significantly higher than those at DRR. However, different patterns of expression of quality parameters could not establish superiority of the quality of basmati rice during sensory evaluation by a panel of experts. The sensory evaluation was based on appearance, cohesiveness, tenderness on touching and chewing, taste, aroma and elongation ratio of rice. Observations of the panel were used to estimate overall acceptability of basmati varieties. During sensory evaluation no difference in quality between the grains of basmati grown in GI and beyond GI was found. Also, Madhya Pradesh, far away from GI region, exported about 400,000 tonnes of basmati produced by the farmers there during 2009. Therefore, on 31 December 2013, the Indian GI Registry at Chennai allowed a plea of Madhya Pradesh for its basmati producers to be covered under the GI tag. So the legal battle won in the United States was lost at home. It will be easier to get protection for 'traditional basmati' under the GI tag according to the norms of the WTO agreement. Such GI protection for 'traditional basmati' will not go against the interest of farmers who export quality rice cultivated beyond GI. Furthermore, the spontaneous local political pressure for the demand of patents under WTO agreement should not be allowed to vitiate the premise of GI.

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Conventional Indian soil testing: need for major change

The Green Revolution made India self-reliant in food grain production[1]. For green revolution, chemical fertilizer input was intensified for increasing the yield[2] and it is a well-known fact that our applied research generally focuses on soil physical and chemical components to maintain or improve soil health for higher productivity. However the soil biological components, specifically soil microbial diversity is generally overlooked[3,4] as is evident from the fact that almost no Krishi Vigyan Kendra or ICAR soil testing laboratories, which are the proximity centres for any farmer, focus on soil metagenomics. Adequacy of soil physical and chemical properties to improve the yield led to neglect of soil microbial functions[5]. There is a rising urgency to understand soil microbial characters[6] and their function to sustain the soil life process and productivity.

Modern techniques such as phospholipid fatty acid analysis help us get insight into the microbial characteristics and community composition for a particular soil environment at very nominal cost[7,8]. If at least this method is adopted by government soil testing laboratories, we may maintain a record of changes of soil microbial communities due to intensified agriculture and possibly it will guide the scientific community to understand the soil biological function more specifically and efficiently. Studies of metagenomics have been initiated 16 year ago[9], but the approach is not geared up in applied sense and Indian farmers are very much aware of physico-chemical status of their soils as compared to biological status. Studies on soil metagenomics and microbial diversity, if strengthened through all Indian soil testing laboratories, will be prospectively beneficial for better understanding of soil functions and its relation with microbial diversity more precisely. Moreover soil microbial studies will alert any undesired soil health impacts, as most of soil ecosystem functions are governed by soil microbial dynamics[10].

Inventions of novel biomarkers facilitate scientific community to get an insight into soil microbial life[11]. Holistic approach is needed to study the soil biological function in changing Indian soil scenario. And if soil microbial life terminating process continues without evaluation through intensive agriculture, then the consequences would be agonizing

and will be the same as Amber Dance stated[6]: 'If soils remain degraded and their many denizens disappear, the world might lose access to organisms that improve crop yields, degrade toxins, or make useful by-products such as drugs – before they're even discovered.' India stands high in international agricultural scientific community[12] and now is the time for soil scientists to make the present soil status holistic so that we can evaluate and restore our soils efficiently.

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Smile with Science

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