

K. C. Puzari, AAU, described some aspects of microbial control of forest diseases which is one of the potential alternatives to chemical pesticides for plant disease management.

G. Gurusubramanian of Tocklai Experimental Station, Jorhat described the abundance and efficacy of bio-control agents through novel approaches. He explained various novel approaches such as push and pull strategy, info chemicals, precision agriculture, genetic engineering technology, crop management tactics and mass rearing technology to maximize the abundance and efficacy of bio-control agents in various agro-ecosystems. P. R. Bhattacharyya of Regional Muga Research Station, Central Silk Board, Kamrup presented a paper on biological control of Uzi fly – a parasite of muga silkworm. He described that biological control is the only answer to manage the Uzi fly menace. Control of Uzi fly through chemicals is not practicable be-

cause of the outdoor nature of muga rearing.

In a lead lecture of the second technical session I. C. Baruah, AAU, discussed the importance of biological control of invasive alien weeds *Mikania micrantha*, *Eichhornia crassipes*, *Parthenium hysterophorus* in respect to crop productivity. P. P. Neog, AAU, presented two papers. In his first presentation he described the efficacy of VAM-fungus *Glomus fasciculatum* alone and in combination with neem cake and carbofuran for management of root knot nematode *Meloidogyne incognita* in greengram. His second presentation was on occurrence and distribution of *Pasteuria penetrans* in root knot nematode infecting some vegetable crops from Golaghat and Jorhat district of Assam. Mantu Bhuyan, RRL, Jorhat discussed the efficacies of plant extracts of *Acacia farnesiana*, and *Acorus calamus* for controlling insects pests. H.

Chingthangkomba Singh, Manipur University, Imphal spoke on the thrips diversity in north-east India. M. Gogoi, Gurgaon College, Simaluguri, discussed the successful use of traditional practices in control of insect pests of host plants of Muga silk worm in lieu of chemical pesticides. He also noted that the fragrance of *Litsaea cubeba* plants has self-controlling power over some particular insect pests. S. R. Borah, AAU, presented a paper on interactions of host-parasitoid interactions of *Helicoverpa armigera* and *Campoletis chloridaeae*. M. Islam concluded with a brief summary of the presentations.

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COMMENTARY

Geographical indications and agriculture-related intellectual property rights issues

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The last three decades witnessed a very impressive growth in agriculture, food production and as a result food became easily available to people below the poverty line. But gradually there has been a stagnation in crop production¹ and the soaring input costs and low output prices are attributed as the main reasons for the desperate life-ending-steps that some of the farmers have resorted to². The deceleration in agricultural growth is a point of great concern and several administrative and policy initiatives have now been drafted or put in place. Indian agriculture grew at 3.9% during the current quarter which clearly shows that adjustments are taking place. The present situation in agriculture is partly due to the fact that Indian agriculture has not fully adjusted itself to the global realities.

Having reaped the benefit through the seeds of green revolution varieties, farmers were quick to realize the importance of good seeds of new and better varieties

of crops. For such superior seeds, farmers were all the more willing to pay a higher price. Seed companies and technology developers saw this as an opportunity to convert plant varieties and important plant genes as profit-making products^{3,4}. Also, as a global strategy, pesticide and seed companies merged to consolidate capital and technology to dominate the market. In various world fora the need to conserve biodiversity, farm level variation, giving credit to farmers for their traditional crop varieties, folk varieties, farmers' variety, access to benefit sharing, extending consumer assurance by way of geographic indications, appellation of origin, traditional knowledge of medicinal plants are discussed to draft several treaties and agreements. Global commodity trade is now dominated by several such new issues, which in India are still not seriously debated and understood.

The carry-over of the colonial agriculture in Independent India was simplistic

in the beginning. Attention was drawn towards the implementation of land consolidation, its distribution, irrigation/water resources sharing procedures, execution of fertilizer and pesticide-related Acts and Rules. They were done to ensure the quality of inputs supplied to the farmer. Also mandi/market reforms and cooperatives were put in place along with sound public distribution system to address the issue of equity and fair access to food. All these policy initiatives did contribute to the success of green revolution and towards substantial growth in agriculture and allied sectors.

The Indian Parliament enacted in 1999 'The Geographical indications (GI) of Goods (Regulation and Protection) Act' for registration and better protection of geographical indications relating to goods. Under Section 1(e) it is defined that 'Geographic Indication' in relation to goods, means an indication which identifies such goods as agricultural goods,

natural goods or manufactured goods as originating or manufactured in the territory of a country or a region or locality in that territory, where a given quality reputation or other characteristic of such good is essentially attributed to its geographical origin and in case where such goods are manufactured goods, one of the activities of either the production or of processing or preparation of the goods concerned takes place in such territory, region or locality as the case may be. The focus of the Act is on quality reputation or other characteristic of such good, which is essentially attributed to its geographical origin. In doing so, the geographical domain can be a territory of a country or a region or locality in that territory. The quality of the product is attributed essentially to its geographical origin and if it is of goods either the raw material production or processing or the preparation shall take place in such territory. The Registrar of the GI shall construe the GI in the Registry.

TRIPS requirements and GI

In the Uruguay Round of WTO negotiations, GI on wines and spirits were granted additional protection under Article 23 of the TRIPS Agreement. And in the Doha Round many member nations are desirous of extending similar level of protection to some of their important goods as well. The TRIPS contains two protection standards for GI and Article 22(2) requires countries to provide a legal means to prevent the use of GI that suggest that the goods originate in a geographic area other than the true place of origin. And Article 22(3) requires that countries should keep in place a legal means to invalidate the registration of trademarks, which contain or consist of a GI with respect to goods not originating in the territory indicated. These provisions are applicable only if the use of the GI is such that it leads to misleading the public as to the true place of origin of the product. Article 24 states that a GI does not have to be protected if it has not been protected or ceases to be protected in the country of origin or when it is a generic term for a product.

The GI is for time-tested products

It is important to be able to distinguish between brand names containing a geogra-

phical term and a geographical indication. The reason why there is an increased rush for GI is that the GI protects the consumer. The GI is perceived as both origin and quality indicator because of which the consumer willingly pays a premium price and that leads to the growth of the regional economy. This is evident by the fact that the European Union alone has granted so far more than 5,000 different GIs.

The GI of Goods Act 1999, is intrinsically integrated with the Section 3 of the Trade Marks Act, 1999 (see Section 2(2) of the GI Act, 1999). The rationale of protecting the GI is similar to that of the Intellectual Property protection. The TRIPS agreement says 'to be eligible for a GI, good must possess a quality, reputation or other characteristics attributable to its geographic origin'⁵. However, there are fundamental differences between Trade Mark (TM) and GI as TM identifies a manufacturer, imply certain amount of human creativity and is usable only by one agency or entity. On the contrary, the GI is complex in definition and perception. It denotes the source of origin, where product quality or specialty that the consumer prefers is governed by the specific physical or biological environment. There is no originality or invention or discovery involved and the GI may depend on Traditional Knowledge (TK) for that product development or on the talent of the craftsman. Also, the GI can be used by all those who produce that product in that given area and are not restrictive.

Trade mark and GI

While TM indicates that the product is affiliated with the manufacturer, the GI indicates to the consumer the high quality and reputation of the produce coming from a defined area. The GI can be used by all producers in the area along with their TM. But as a rule, TM that contains a GI cannot be protected, if the use of the TM misleads the public about the true origin of the product. The development of GI is a time-tested process and to carve an aura about the product it takes decades if not centuries. GI creates a positive impression of the product quality, the environmental virtue and human skill of the area. The premium price it fetches happens in a gentle manner over a protracted period of time and by varied as-

essment procedures. Only if the GI can create a positive mind frame on the client over the product will the GI be considered to have some virtue. So while extending the use of GI for food products care should be taken to ensure that the GI strictly complies with all these requirements. Extending the GI for products that are yet to establish a reputation and consumer credibility will dilute the whole purpose of having market dominance and may discredit the entire exercise.

Ethnic immigrant effects on GI

The post World War II period witnessed a large scale migration and settlement of people from old world nations to the new world countries. These migrants carried with them their ethnic craft and plants to their new found lands. They even named in the new territory provinces, cities, streets, rivers and mountain after the ones in their 'original homeland'. With several subsequent minor modifications many foodstuffs and farm products were marketed in the new world with brand names and GI that of their 'original homeland'. This situation creates enormous confusion in the market place between original and new settlement products. There is a running global debate on this confusion of GI, and with emotions being high; the issue has become very complicated.

The need to avoid making GI too generic

A zone is an area of land without any particular qualifying attribute. And a region is a single tract of land comprising independently owned farmlands, e.g. North West India. A region is said to be discrete between adjoining regions with measurable homogeneity. The sub-region ensures a substantial level of homogeneity in the attributes of the produce covered under GI. Therefore, there is likely to be minor variation in the product, if the GI area is large. For example, Basmati rice if granted GI may cover the rice-growing tracts of North West India and Pakistan while there are minor but acceptable levels of variations between Basmati from Amritsar, Karnal/Kurukshetra and Dehradun for the reason that this rice growing zone is quite large and enjoys some variation in climate. The current Basmati

definition accommodates certain defined number of varieties and if the scope of the definition is further enlarged for the purpose of clubbing several of the new rice genotypes that may have Basmati-like or better grain, then such an action may even defeat the very purpose of seeking market dominance for this product through GI.

For purposes of the regulation, a name that has become generic means the name of an agricultural product or foodstuff which, although relates to the place or the region where this product or foodstuff was originally produced or marketed, has become the common name of an agricultural product or a foodstuff. To decide if a given GI has become generic, the following factors can be considered:

- Assess the prevailing situation in the member state in which the GI name originates and the area of consumption of the produce.
- The situation in other member states on the above parameter be examined.
- The relevant national or community laws should have adequate provisions to govern reputation.

The case of 'Feta' cheese that has GI involving Greece and the verdict of the European Commission are worth examination. It is in this context that understanding the GI for 'Basmati' and the definitions given in the 'Export of Basmati Rice (Quality Control and Inspection) Rules, 2003' are important. Adding several other new recent rice materials under the GI banner Basmati would lead to the Basmati GI becoming generic. These new varieties of very high grain quality, with high productivity per hectare can be given another brand name and brand equity can be promoted. Maybe India has to build different quality brand names in rice to offer a wide choice of material to the consumer. Trade concerns, consumer trust and maintenance of product quality are the essence of GI and that would get eroded if the brand Basmati becomes a generic term. Since cultivation of Basmati involves the livelihood security of millions of farmers, rocking the term 'Basmati' periodically, with conflicting objectives is not desirable. And a generic definition of GI for basmati and 'Claw Back' (CB) option of the European Community, are to be kept in mind.

The GI used to describe an agricultural product or foodstuff should cover:

- Originating in specific region, place or country, and
- Possess a specific quality reputation or other characteristics attributable to that geographical origin and the production and/or processing of which is done in the defined geographical area.
- Any established/traditionally valued direct link must exist between the quality or characteristics of the product and its specific geographic origin.

Very often the GI material are named and misspelled in a manner that consumers are misled. Homonymous indications are those that are spelled and pronounced alike but mean different as the geographical origin of these products originate from different countries. Conflicts invariably arise when products of homonymous GI are used and sold in the same market. The problem becomes acute if the homonymous GI products are identical in nature. Honesty in business not being a virtue, clandestine branding of GI is a stark violation of trade rules and procedures and now is legally punishable.

The European Community has taken steps to 'Claw-Back' (CB) certain GI originating in the European Community such as the Trade Mark PARMA that was registered in good faith and not as a GI indicating its country of origin as Mexico. The Claw Back of the GI means confiscating trademarks without any compensation and without representation from the trademark owner during the negotiations. The GI protection therefore calls for multilateral system for the notification and registration of GIs and the issue of 'Clawing Back' of country approved GIs on the basis of generic terms or trade needs through discussion. A sound international binding on GI matters is required to ensure that trademark owners and users of prior generic terms enforce their legal positions properly.

There is a likelihood of minor variation in a GI-covered product and the degree of such variation must be documented. Due to the genetic heterogeneity of the material covered by GI there may be subtle variation in the variety between sub-zones of the geographic area occupied by that variety. For example, if 'Basmati Rice' is a GI and the defined zone for growing 'Paddy Basmati' is the foothills and adjoining plains of Punjab, Haryana and Uttaranchal, then the variation in rice quality due to 'Amritsar Basmati', 'Karnal Basmati', 'Dehra Doon Basmati', etc.

can be accounted. Each of these sub-zones covers a micro niche of 75 km diameter tract with comparable environment, soil and plant type. Growers in these sub-zones can be registered and their produce can be barcoded for traceability of the nature of the produce. The GI backed by barcoded traceability will enhance the consumer confidence. And if the 'Paddy Basmati' of these sub-zones happen to be 'Farmers' Variety' and are registered under the PPV&FRA 2001, then the trade interests of 'Basmati Rice' will be very secure. This then will permit differential pricing for the sub-zone quality and the year-to-year fluctuation in price variation.

Indication of source/Appellation of origin

'Appellation of Origin' (AO) means that a product originates in a specific geographic region and the characteristic qualities of the product are due to the geographical environment, including natural and human factors. Most of the agricultural produce falls under AO. The Lisbon Agreement defines the AO as the geographical name of a country, region or locality that serves to designate the product originating therein, the quality and characteristic which are exclusively or essentially due to the geographical environment, including natural and human factors.

'Indication of source' means that a product originates in a specific geographical region. The 'Indication of Source' is clarified as 'all goods bearing a false or deceptive indication by which one of the countries to which this agreement applies, or a place situated therein, is directly or indirectly indicated as being the country or place of origin shall be seized on importation into any of the said countries'. The Lisbon Agreement is considered to be narrow in its scope on AO than the GI now discussed under TRIPS. It is primarily because the AO is not based on the reputation of a product which also means that the TK is not a requirement for getting AO accredited.

Relationship between farmers' variety (FV) and GI

The PPV&FR Act 2001 provides certain rights to farmers, such as to save, use,

sow, resow, exchange, share or sell his farm produce including that of the registered variety. Farmers cannot multiply the seeds of the notified variety on their own or market seeds of registered variety as branded seed with packing, label, etc. and such violation may invite infringement action. The Act recognizes farmers as plant breeders and therefore has extended the benefit of entitlement for developing commercial varieties through unaided plant breeding initiatives. Plant breeding calls for advanced scientific knowledge, access to diverse germplasm and meticulous experimentation to assess the commercial potential of the material. Farmers who do develop new varieties of plants like any other plant breeder can apply their material for the conduct of Distinctness, Uniformity and Stability (DUS) testing and registration. This decentralization of variety development is one benefit that would spin-off from the PPV&FRA, 2001.

The PPV&FRA 2001 provides breeders certain ownership claim of their varieties subject to meeting the requirements of Novelty in the case of new variety; and Distinctness, Uniformity and Stability. In many cases uniformity invariably provides a window for the assessment of stability. In open pollinated crops the uniformity depends on the nature of the inbred line. That apart, it also depends on the plant breeding methodology followed (top cross, two way cross, etc.). If genetic male sterile systems (GMS) are used in hybrid development then the level of uniformity may pose a limitation. The private seed companies tend to focus their attention on the endowed areas where farming is efficient, diverse and productivity levels are high. Crops grown under marginal, suppressive soils or under arid conditions may not get the same type of attention from private plant breeders. But gradually, over an extended period of time the benefit reaches out to all farmers.

In the last hundred years there has been a drive for improved agriculture and that has replaced farmers' variety in several crops with new varieties developed by the plant breeders. Yet farmer's variety is still dominant in pulses, vegetables, melons, etc. The GI for agricultural goods like Basmati rice, coffee, tea, wine, etc. revolve around consumer preferences for the palate feeling, aroma and physical appearance that enhances the appetite. An ideal mixture of all these attributes raises the value of the product

due to reasons of consumer preference. The GI therefore is under negotiation in the Doha round of WTO and an acceptable stand is yet to emerge. India has a GI Act in place and a number of agricultural and handicraft products have been given the GI. India should examine the GI for its agricultural produce like Basmati rice, Alphonso mango, etc., seriously to give it a comprehensive protection of the plant material as FV under the PPV&FR Act 2001 and at the same time give GI protection for produce such as rice, mango fruit and fruit products, etc. Such a double coverage will enable intellectual property protection of the plant material and market advantage to the quality produce through GI.

The traceability issue

The GIs are essentially collective marks and are put to use for the collective benefit of the producers in a given region. The traceability of the raw material that yields the GI produce is important and the details of the growers and their track record details are a matter of detailed documentation. Genotype apart, the cultivation practices and seasonality of various consignments should be within an area range and the quality of the produce must remain comparable if GI is to be sustained as a trade advantage. This calls for proper survey of the growing area, identifying the farms, documenting their cultivation details, giving them their unique number which can be traced, indicating it in the container of the graded and packed produce, etc. The cost involved in this exercise is to be met by the growers themselves or their organizations. This added expenditure should match the market benefit that farmers will get out of this exercise. The consumer will bear the burden of cost in many of these cases and he should see that the value provided to his food source traceability and its dependability is acceptable to him. Very often these requirements are imposed on the produce originating from a developing country by the West, insisting on it as part of the quality assurance drive. But the hidden agenda could be to use this as a non-tariff barrier to discourage imports. To comply with the traceability demand, developing countries have to invest in a high technology and thus would incur an overhead expenditure to sustain their agriculture exports. So it can also lead to multi-

nationals coming in a big way with capital and technology and they may do the export of Indian farm produce.

Origin of the material and access to benefit sharing

The farming community contributions have to be recognized and rewarded and benefit sharing should become mandatory through the gene fund created under the PPV&FR Act 2001. The FAO-promoted International Treaty on Plant Genetic Resources for Food and Agriculture, Article 18(4)(d) deals with funding strategy 'each party agrees to undertake, and provide financial resources for national activities for the conservation and sustainable use of plant genetic resources for food and agriculture'. So the national programme shall meet the expenses involved in germplasm sustenance. Article 13(2) elaborates the benefit-sharing mechanism. It further elaborates that 'the recipient who commercializes a product that is a plant genetic resource for food and agriculture and that incorporates material accessed from the multilateral system shall pay to the mechanism referred to in Article 19(3)(f), an equitable share of the benefits arising from the commercialization of that product except wherever such a product is available without restriction to others for further research and breeding, in which case the recipient who commercializes shall be encouraged to make such payments'. It appears that selections made by the National Agricultural Research Systems (NARS) and private plant breeding from the various CGIAR materials, if released for cultivation and restricted from sharing with others due to property rights reasons, then as per the Treaty third party benefit sharing will become mandatory.

The need to protect Traditional Knowledge

The TK is not well documented to stand as supportive evidence to validate the element of invention or discovery or novel methodology involved in product development or the development of a craft. Lack of documentation of indigenous farmers' plant breeding is attributed as a major reason for failure to consider the possibility that farmers have an intellectual investment in their folk varieties⁶.

There are several issues connected with biodiversity, rural peoples' medical knowledge, plant genetic resources, farmers' variety and GI. Traditional Knowledge is a point to prove that it is prior knowledge or common knowledge and the element of invention or discovery or novelty is not there in cases with neem, turmeric, ginger, etc. and hence patent applications making a claim of originality needs careful examination. Considerable effort has gone in, during the last decade or so to document the traditional wisdom on these issues available in various Indian

languages. India must straighten out these issues in the various international negotiations and press the need for considering before a patent is granted to a product in the convention countries. India should develop a system to grant community rights to the TK similar to what PPV&FR Authority is granting for farmers' variety.

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OPINION

Whither science in India

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C. N. R. Rao has sounded an alarm apprehending the bleak future of science in India¹. Why the situation has come to such a pass possibly demands a thorough probe to unearth the underlying causes and then take remedial measures. I feel, if we look back a little, it will not be too difficult to identify some of the root causes.

Jawaharlal Nehru, the great visionary for shaping India's destiny, was of the firm conviction that it is science alone that can solve the problems of hunger and poverty, of insanitation and illiteracy, of superstition and of deadening custom and tradition, of vast resources running to waste, or a rich country inhabited by starving poor². Guided by this conviction he went ahead and during his regime (1947–1964) came up with around 25 research institutions under the Council of Scientific and Industrial Research; dozens of laboratories, research centres, stations and substations under Indian Council of Agricultural Research, and a few laboratories under Indian Council of Medical Research. The Defence Research and Development Organization was constituted and a large number of laboratories devoted to aeronautics, armaments, electronics, etc. started functioning. The Atomic Energy Act was passed in 1948, and the decision to create Atomic Energy Estab-

lishment, Trombay (now Bhabha Atomic Research Centre) was taken in 1954; it was formally inaugurated by Nehru in 1957. Five Indian Institutes of Technology came up in quick succession at Kharagpur, Bombay, Delhi, Kanpur and Madras. Similarly, in the sphere of medicine sprang up the All India Institute of Medical Sciences at New Delhi, Jawaharlal Institute of Postgraduate Education and Research at Pondicherry, Institute of Postgraduate Medical Education and Research at Calcutta, and Postgraduate Institute of Medical Education and Research at Chandigarh. Nehru envisioned an all-round S&T development in the country. Hence, it did not take long for the first agricultural university of India to take root at Pantnagar as UP Agricultural University in 1960 followed by Orissa University of Agriculture and Technology and Punjab Agricultural University³. The launching of *Sputnik* by Soviet Union on 4 October 1957 heralded simultaneously the onset of the space age as well as the space race. Just in a few years time the enormous potential space technology was holding, became evident. India could not afford to lag behind. Hence, Indian National Committee for Space Research (INCOSPAR) was formed by the Department of Atomic Energy in 1962 and work started on the establishment of

Thumba Equatorial Rocket Launching Station (TERLS)⁴. On 21 November 1963, the first sounding rocket of India was launched from TELRS⁴. The list does not end here and can be lengthened a great deal further.

Nehru's attachment to science was so great that he religiously attended the Indian Science Congress every year and delivered his inspiring address. During his tenure of 17 years, Nehru tried to do everything possible to make India no less a superpower in science. Today, if we have joined the nuclear club, space club, have surplus food, and have raised India to the level of a developed country as far as science is concerned, it is because of those scientists who started flourishing unhindered during the Nehru era.

The infrastructure and environment that Nehru created for the rapid development of science in India paid rich dividends. A study conducted by American Institute of Physics in 1964 showed that India ranked ninth in the world in the field of physics in terms of journal papers, next only to USA, USSR, UK, Japan, France, Germany, the Netherlands, and Italy⁵. In 1998, India's position in the field of chemistry was ninth, next only to USA, Japan, Germany, France, UK, Russia, China and Italy. In 2004, the ranking underwent a radical change, pro-