



International Coffee Organization
Organización Internacional del Café
Organização Internacional do Café
Organisation Internationale du Café

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**Communication from the
Coffee Board of India**

Background

The attached document contains the response of the Coffee Board of India to the comments of the Virtual Screening Committee on the revised project proposal “Breeding coffee plants with durable resistance to coffee leaf rust, anthracnose and other diseases”. The comments of the VSC on this proposal are contained in document EB-3906/06 and the project proposal has been circulated as document WP-Board 979/05.

Action

The Executive Board is requested to consider the comments received from the Coffee Board of India in response to the Virtual Screening Committee’s reports on the revised proposal “Breeding coffee plants with durable resistance to coffee leaf rust, anthracnose and other diseases”.

Response of Coffee Board of India to the comments of the Virtual Screening Committee on the revised project proposal for the project on “Breeding coffee plants with durable resistance to coffee leaf rust, anthracnose and other diseases” circulated for the EB meeting scheduled for January 30, 2006.

- (a) Quality of the brew obtained from the materials that are proposed to be the focus of the project, Selection-5A and Selection-6 is well accepted in the markets. In fact, the quality reports available at Central Coffee research Institute (CCRI) indicate that these selections produce a well-balanced cup (Annex -1). This balanced cup was achieved by selection for beverage quality at every stage in the selection of mother plants in advancing generations (such as from first generation to second generation and on to third generation). Presently, third generation materials are ready for exploitation. Besides inherent good quality of these materials, it is expected that their produce is relatively residue-free because of their least requirement for fungicides, pesticides etc. rendering it safer for consumption. This adds a newer dimension to the beverage quality of these selections. Utmost care is always exercised while selecting the materials for generating newer plant materials which produce higher yield and cup quality in our breeding programme. Sustainable yield and acceptable cup quality as well as the materials which can be easily managed without much use of plant protection chemicals are the focus points in coffee plant improvement programme in India.
- (b) Budget provisions made for component –1 are eminently justified on account of the true requirement to establish demonstration plots and generate marker assisted selection data that can be effectively utilized in the improvement of the materials to be focused in the project as well as materials coming forth in the future. It may be noted that the demonstration plots established will also be utilized for the experiments envisaged in component –2. Thus, a good deal of the proposed expenditure is an overlapping budget provision for components 1 and 2. However, it is important to make it clear that CCRI already possesses adequate infrastructure for marker research work and is already active in this sphere of research. Thus, the equipment proposed to be purchased in the course of the project is need based to implement the project vigorously and complete the proposed task within the proposed time frame. In other words, the proposed equipments leads to an efficient, precise and faster execution of the project objectives in achieving the goals proposed in the project.
- (c) Use of pest and disease resistant planting materials is the main desire of growers in India (elsewhere also) so that the cost of cultivation can be brought down considerably for sustainability in the case of large fluctuations in market prices. During the crisis period of 1998-2004, the growers who planted resistant materials could retain their plants with minimum losses while those who had only older materials suffered the greatest losses. The integrated

disease management (IDM) as it is practiced now integrates the application of Bordeaux mixture and systemic fungicide sprays. In a recent Farmer Participatory exercise experiments, use of bioagents and botanicals as components of IDM is envisaged and experiments were initiated. Preliminary results from various experiments indicate that the bioagents *Bacillus subtilis*, *B. megaterium* and *Pseudomonas flourescens* isolated from the rhizosphere of the coffee soils can inhibit the germination of urediniospores of *Hemileia vastatrix* to an extent of about 20% *in-vitro* and led to 20-25% reduced incidence of disease in field experiments at a concentration of 1×10^8 spores per ml of suspension. *B. megaterium* and *P. flourescens* were also observed to promote the growth of nursery seedlings leading to improved shoot elongation and leaf area, thus rendering seedlings more vigorous. Botanicals used in initial experiments are, leaf extract of *Lantana camara*, bulb extract of *Allium cepa*, kernel extract of *Azadiritchta indica* and rhizome extract of *Curcuma longa*. Application of these extracts in disease control led to a reduction of the order of 50-66% of the disease. It is on account of these preliminary results and easy ready accessibility of these materials to many small growers that further experimentation and optimization of their use is envisaged in the project. In the IDM experiments with bioagents and botanicals mentioned above, the higher levels of observed control (bioagents 25% and botanicals 66%) are on the resistant materials, especially Selections 5, 6 and 9. Thus, the focus on resistant materials is adequately justified in being the most efficient way to achieve the project objectives. The two varieties chosen, Selections 5 and 6 are both derived from arabica - robusta hybridization, but had diverse origins combining genes from different parents of these two species. This implies that a large array of resistant genes is available in these two selections. They also combine the horizontal resistance elements of Rume Sudan and robusta. Combining these two selections leads to relatively uniform quality of the produce from plant materials that constitute a natural gene pyramid to combat the diseases and consequent lowered incidence of pests and diseases with minimal application of chemical control measures. Thus, the IDM strategy proposed to be developed in the project with resistant material as the main focus and integration of bioagents and botanicals has a strong conceptual back ground and great practical utility in achieving sustainable coffee production. Sustainability of coffee production especially depends on lower inputs without sacrificing the yield and quality aspects. In India nearly 98% of the farmers are small growers; they need the plant materials which can effectively withstand the adverse effects of weather, pest and diseases in particular to make their cultivation more meaningful and sustainable. The project proposed has given importance to educating the farmers through farmer participatory approach and on spot trials and demonstration. The project also aims at capacity building exercise within the farmer groups so that they can make their production cycle more remunerative. The project believes in technology development which can be easily adopted and accepted by farmer community.

- (d) The advice is well taken and free seed supplies will be restricted to the establishment of demonstration plots only in the farmer's field which is very essential to convince and demonstrate the added utility of growing tolerant varieties with added advantage of cost benefit ratio. The budget allocation can be accordingly revised and diverted to conduct participatory exercises, seminars, workshops, awareness camps and farmer field school sessions in which farmers will be trained on the use of new techniques and the advantages thereof. They will also be informed of the merits of the new resistant materials. Part of the funds will also be diverted to data collection and economic assessment under diverse agronomical conditions.**
- (e) And (f) The IPR model proposed is in consonance with our policy. It should be understood that providing coffee varieties of Indian origin in exchange for the germplasm of a recipient Country is not the creation of a hostage situation. This is the simplest and most honest way of exercising IPRs. Considering the possible poor economies (as most coffee producing Countries are developing or under developed Countries), the IPR model suggested did not impose any Royalty on them even if they exploit the germplasm directly or develop EDVs and exploit them in their own Country. Royalty Clause is added only to the context of sharing the germplasm or EDVs with a third party Country. This is quite normal. The Selections 5A and 6 are both developed at CCRI with Breeders efforts and investments of the Coffee Board of India. It is only natural that the Coffee Board exercises the rights in laying down the IPR Clauses. However, modifications needed to fit the ICO – CFC requirements if any can be discussed with the experts to re-orient/re-phrase the proposed Clauses. We are open to any alternate formulation that CFC requires it as an equitable proposition.**

Annex –1

Indian Coffee Selections and Quality

Data on the quality of Indian coffee selections is assembled in the table below. Samples for these various tests were prepared from CCRI as well as from its sister concerns. The data indicate a relatively consistent beverage quality of the selections in various tests over the period 1984-2001. An important point to be noted is that the whole range of selections and years did not throw up any significant differences in the taste profile of Arabica coffee varieties. The quality of various selections derived from diverse parents combining the genes of *C. arabica* (Arabica), *C. Canephora* (Robusta) and *C. liberica* (Liberica) appears not to be differing significantly. This manifestation has powerful implications for breeding to improve the quality of beverage as Robusta and Liberica produce a very inferior beverage. Thus, the genes of Liberica that remain introgressed in the Arabica variety Sln.3 (S.795), Sln.7.3 and Sln.10 [(Caturra x Cioccie) x (Caturra x S.795)] are confined to the resistance factors (S_H genes) and all others appear to have been eliminated or neutralized in the course of evolution of these selections. Similarly, Selections 5, 6, 8, 9 and Cauvery/Catimor that incorporate the genes of Robusta also are not expressing them in the context of quality.

Quality of Indian Coffee Selections

Selection	Years of Testing				
	1984	1997	1999	2000	2001
Sln.3 (S.795)	FAQ- Moderately Good	FAQ	FAQ	FAQ	Sl. Below FAQ- FAQ
Sln.5A	--	--	--	FAQ ⁺ -Good	FAQ ⁺ as Special Coffee
Sln.5B	Sl. Below FAQ-FAQ	--	FAQ ⁺	FAQ-FAQ ⁺	FAQ ⁺ -Good
Sln.6	Sl. Below FAQ-FAQ	--	FAQ- FAQ ⁺	FAQ ⁻	FAQ ⁺
Sln.7.3	--	--	FAQ	FAQ-FAQ ⁺	FAQ ⁺
Sln.8	--	FAQ	Good	FAQ-Good	Below FAQ
Sln.9	--	FAQ	FAQ- FAQ ⁺	FAQ ⁻	Below FAQ
Sln.10	Sl. Below FAQ-FAQ	--	FAQ	FAQ	FAQ-FAQ ⁺
Sln.11	Sl. Below FAQ-Good	Sl. Below FAQ-Good	FAQ ⁺	FAQ-S. Above FAQ	FAQ ⁻
Cauvery/Catimor	Sl. Below FAQ-FAQ	Moderately Good	FAQ ⁺ - Good	FAQ-FAQ ⁺	FAQ ⁺
Sarchimor	FAQ-Good	FAQ-Good	Good	FAQ	--

G V Krishna Rau
Chairman, Coffee Board of India