

International Multi Location Variety Trial (IMLVT) of Arabica Coffee in India – It's relevance and implications in breeding for durable rust resistance

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RATIONALE

- Coffee leaf rust (CLR) the *Hemileia vastatrix*, is still a major disease of concern for Arabica coffee (*Coffea arabica*), world over
- Durability of resistance in improved varieties is often challenged by the evolution of new races of CLR, specially in high disease environments
- Genetic nature of the resistance donor is very important for manifestation of durable rust resistance in its derived varieties
- Therefore, selection of efficient donor for breeding purposes is very critical for durable rust resistance breeding especially for the countries like India, known for vast diversity of CLR pathogen and favourable climate for CLR buildup.
- In this context, IMLVT – CCRI aimed at field evaluation of varieties of diverse genetic background in CLR favourable environment has relevance.

MATERIAL & METHODS

- An IMLVT of Arabica was planted at CCRI, India in 2015-16, as part of a multi-country initiative of World Coffee Research (WCR)
- IMLVT-CCRI included 28 arabica varieties of diverse pedigree developed in coffee-producing countries around the world.
- Two varieties (Chandragiri & Sln.9) were planted as local checks
- To identify resilient varieties best suited for Indian conditions, field response of individual varieties to CLR has been monitored
- Individual plants were visually scored for CLR susceptibility and disease build up was scored using a 1 to 5 scale (Sera et. al., 2010*) that ranges from no pustules to complete defoliation

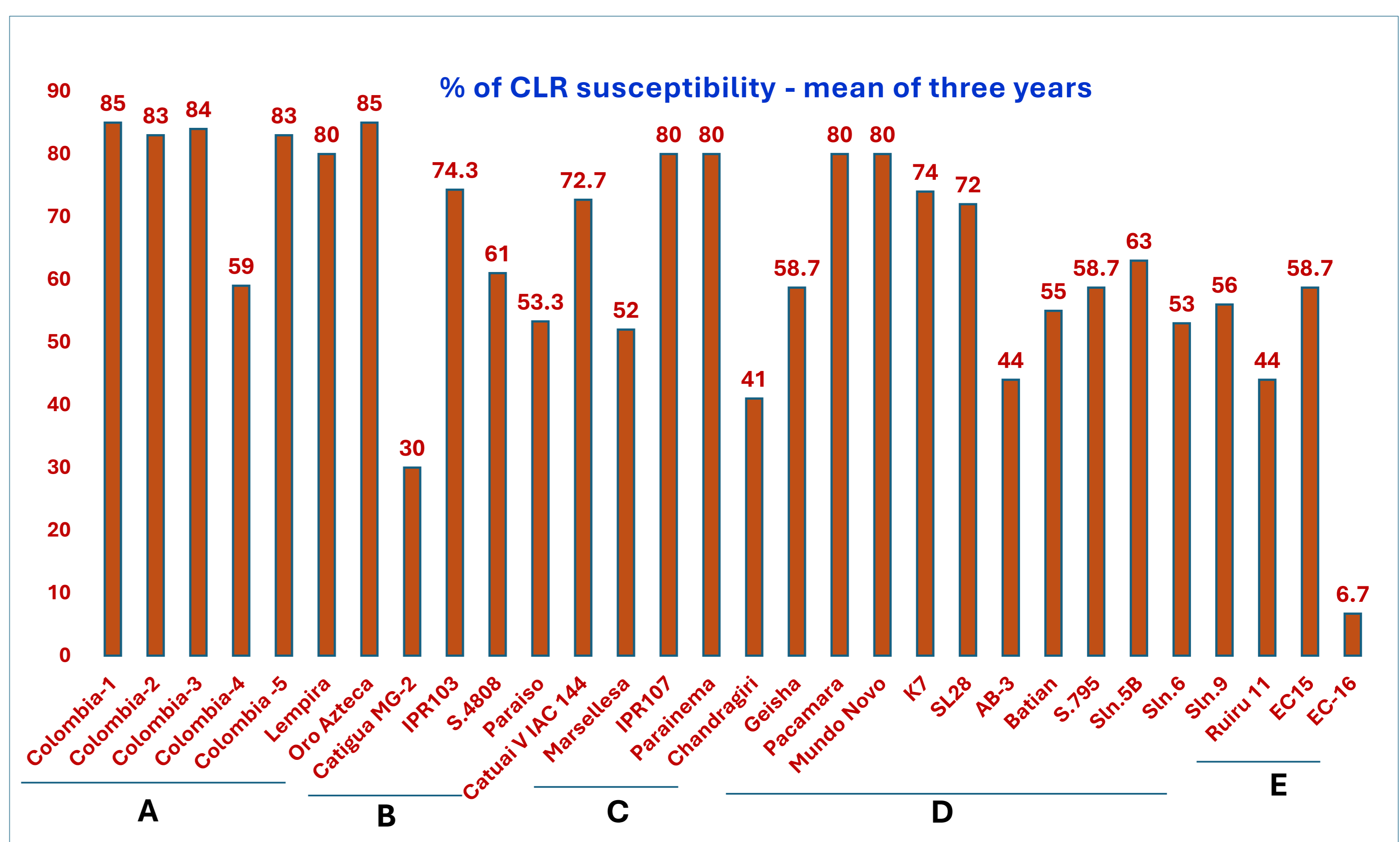
Varieties included in IMLVT - CCRI

Sl. No	Variety	Source	Introgressed lines & Pure Arabicas (D)
Catimor Derivatives (A)			16 AB-3 Indonesia
1	Colombia-1	Colombia	17 Batian Kenya
2	Colombia-2	-do-	18 K7 Kenya
3	Colombia-3	-do-	19 SL28 Kenya
4	Colombia-4	-do-	20 S.795 India
5	Colombia-5	-do-	21 Sln.5B India
6	Lempira	Honduras	22 Sln.6 India
7	Oro Azteca	Mexico	23 Sln.9 India
Catuai Derivatives (B)			24 Geisha Panama
8	Catigua MG-2	Brazil	25 Pacamara El Salvador
9	IPR103	Brazil	26 Catuai V IAC144
10	S.4808	India	27 Mundo Novo 379/19
11	Paraiso	Brazil	
Sarchimor Derivatives (C)			F₁ hybrids (E)
12	Marsellea	ECOM & CIRAD	28 Ruiru 11 Kenya
13	IPR107	Brazil	29 EC15 ECOM & CIRAD
14	Parainema	Honduras	30 EC-16
15	Chandragiri	India	



RESULTS AND INFERENCES

- The Catimor derivatives (A) & Pure Arabicas (D) manifested high CLR incidence, 59% to 85% of plant population. Disease severity was high, 2.8 to 4.2 (1-5 Scale).
- Among the introgressed varieties (D), CLR susceptibility ranged from 44% to 63% of the population and disease severity recorded was moderate, 2 to 2.9.
- The CLR manifestation varied in different Catuai derivatives (B), and susceptibility ranged from 30% to 74%. The disease severity varied from 1.5 to 3.2.
- In Sarchimor derivatives (C), Parainema and IPR 107 manifested high susceptibility (80%) as well as disease severity (2.3 & 3) compared to Marsellea and Chandragiri.
- Among F₁ hybrids (E), EC16 manifested high field tolerance followed by Ruiru 11.
- Few Sarchimor (Marsellea, Chandragiri) & Catuai (Catigua MG2) derivatives manifested high field tolerance indicating the prospects of resistance donors HdeT CIFC 832/2 & CIFC2570 in durable rust resistance breeding
- Performance of F₁ hybrids reflected the resistance spectra of parents used.



CONCLUSIONS & PERSPECTIVES

- IMLVT-CCRI established the field response of 28 varieties of different origins against a vast diversity of CLR pathogen in India.
- Varieties derived from HdeT CIFC 832/2 manifested durable rust resistance over other HdeT derivatives (CIFC 832/1 & CIFC 1343).
- Provided a clue on potential of HdeT CIFC 2570 as an alternate donor for CLR resistance breeding in India.
- IMLVT-CCRI validated the prospects of F₁ strategy in achieving durable resistance to CLR
- The perspectives include the development of three heterotic F₁ hybrids involving varieties derived from HdeT CIFC 832/2 & HdeT CIFC 2570 as resistance donors and successful tissue culture multiplication of the F₁s through public-private partnership, for commercialization.