

Resistance to brown eye spot in cultivars and wild accessions of *Arabica* coffee characterized using REML/BLUP methodology

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Introduction

- Brown eye spot (BES), caused by the fungus *Cercospora coffeicola* Berk. & Cook, is one of the major diseases of coffee plants, widely distributed in coffee-producing countries.
- The objective of this study was to estimate genetic parameters and predict genotypic values for the evaluation of resistance to BES in Ethiopian wild accessions and cultivars of *Coffea arabica*, using the REML/BLUP methodology.

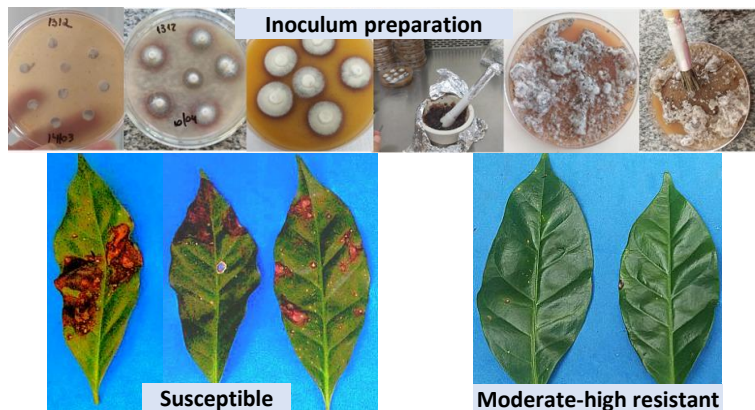


Table 1. Genotypic values ($\mu + g$), lower confidence interval limit (LCIL), upper confidence interval limit (UCIL), resistance levels (RL) for the variable % of leaf area affected of 20 accessions and 4 cultivars, ranked from the most susceptible to the most resistant coffee genotypes, out of a total of 76 genotypes evaluated for resistance to brown eye spot.

Rank	Genotypes	u+g	LCIL	UCIL	RL ⁽¹⁾
1	E130/IDR.169	16.98	13.89	20.06	HS
3	E088/IDR.3435	9.66	6.57	12.74	S
7	E025/IDR.308	7.57	4.49	10.65	S
8	E037/IDR.676	6.81	3.73	9.89	L
22	IPR 102	3.46	-0.44	7.35	L
23	E221/IDR.214	3.33	0.25	6.42	M
30	Catuai V. IAC 99	2.83	-1.07	6.72	L
37	Catuai A. 2SL	2.57	-1.33	6.46	M
55	IPR 103	1.41	-2.49	5.30	M
56	E080/IDR.584	1.41	-1.68	4.49	M
57	E546/IDR.563	1.39	-1.70	4.47	MH
64	E081/IDR.041	1.18	-1.90	4.27	MH
65	E228/IDR.534	1.18	-1.91	4.26	MH
66	E218/IDR.641642	1.18	-1.91	4.26	MH
67	E131/IDR.018019	1.14	-1.94	4.22	MH
68	E116/IDR.286	1.11	-1.98	4.19	MH
69	E159/IDR.656	1.08	-2.01	4.16	MH
70	E041/IDR.662	1.06	-2.02	4.15	MH
71	E087/IDR.195	0.99	-2.09	4.08	MH
72	E201/IDR.134	0.98	-2.10	4.07	MH
73	E199/IDR.092	0.98	-2.11	4.06	MH
74	E189/IDR.119	0.97	-2.11	4.06	MH
75	E123b/IDR.120	0.95	-2.14	4.03	MH
76	E183/IDR.138	0.76	-2.32	3.85	MH

⁽¹⁾ HS = highly susceptible; S = susceptible; L = slight; M = moderate; MH = moderate-high.

Materials/Methods

- **Plant material:** 72 wild accessions from Ethiopia and 4 *C. arabica* cultivars.
- Seedlings with six pairs of fully expanded leaves.
- **Artificial inoculations of *Cercospora coffeicola*:** 5 mL of conidial suspension at a concentration of 5×10^4 conidia/mL.
- The last two pairs of fully expanded leaves were inoculated.
- After inoculation, the plants were kept in a moist chamber for 24 hours and subsequently transferred to the nursery.
- The experimental design used was completely randomized, with ten replications of one plant per plot.
- **Evaluation of resistance to BES:** 30 days after inoculation.
- **Variable:** percentage of leaf area affected (%LAA).
- The data were analyzed using the **Selegen REML/BLUP software**.
- Statistical differences among genotypes were analyzed based on the overlap of the lower (LCIL) and upper (UCIL) confidence interval limits of the predicted genotypic values ($\mu + g$).

Results/Discussion

- The individual broad-sense heritability (h^2g) for resistance to BES was 0.26.
- The genotypes exhibited resistance levels ranging from highly susceptible (HS), susceptible (S), slight (L), moderate (M), to moderately high (MH) (Table 1).
- 20 wild accessions (E183, E123b, E189, E199, E201, E087, E041, E159, E116, E131, E218, E228, E081, E044, E057, E123a, E287, E174, E180, and E546) were classified as MH and exhibited higher resistance levels than Catucaí Amarelo 2SL and IPR 103 (Table 1).

Conclusion/Perspectives

- The moderate magnitude of heritability and the intermediate resistance levels observed indicate that resistance to BES in the coffee plants studied is strongly influenced by environmental factors.
- Farmers can use the **Catucaí Amarelo 2SL** and **IPR 103** cultivars as one of the strategies to mitigate losses caused by BES, as they showed moderate resistance and also present high productivity along with slight resistance to leaf rust.
- The Ethiopian wild accessions with higher resistance levels should be used by breeding programs aiming to develop new cultivars resistant to BES.