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Clustering of *Hemileia vastatrix* samples and their pathogenicity on three coffee varieties in Peru

#33504

Ricardo Borjas-Ventura[1] Deyna Valderrama-Palacios[1] Fabiola León-Rojas[1] Viviana Castro-Cepero[2] Leonel Alvarado-Huaman[1] Segundo Bello-Amez[1] Alberto Julca-Otiniano[1]

[1]Departamento de Fitotecnia. Facultad de Agronomía. Universidad Nacional Agraria La Molina. Lima. Perú.
[2]Departamento de Biología. Facultad de Ciencias. Universidad Nacional Agraria La Molina. Lima. Perú.

Email: rborjas@lamolina.edu.pe

INTRODUCTION

Coffee in Peru, with more than 400,000 ha under cultivation, is a major crop, and coffee leaf rust (*Hemileia vastatrix*) is its most significant disease. In Peru, the pathogen was first reported in 1979, and it re-emerged as an epidemic during the 2012–2013 season, causing severe losses (60% of the harvest, valued at US$290 million). *H. vastatrix* is a fungus with high genetic variability; to date, more than 55 races have been identified. For the design of integrated pest management (IPM) programs, it is essential to understand both the variability of the fungus and the performance of the coffee varieties cultivated in the country. To date, the pathogenic variability of this fungus in Peru remains unknown, as does the response of some resistant varieties grown in the Peruvian Amazon. It is even believed that certain varieties may have lost their resistance to the disease.

General Objective

To determine the pathogenic variability of coffee leaf rust (*Hemileia vastatrix*) and the response of selected resistant varieties cultivated in the Peruvian Amazon.

Specific Objectives

•To determine the pathogenic variability of coffee leaf rust (*Hemileia vastatrix*) in the Peruvian Amazon.

•To evaluate the response of three resistant coffee varieties to different types of coffee leaf rust collected in the Peruvian Amazon.

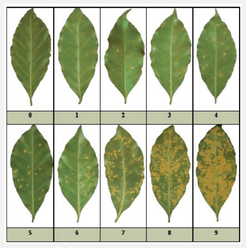
MATERIALS/METHODS

Ninety-three isolates were collected [18 in the north (RN) + 43 in the center (RC) + 32 in the south (RS)]. The uredospores were placed in gelatin capsules and transported to San Ramón (Chanchamayo), where the research was conducted. Two trials were conducted; in the first, the Bourbon and Caturra varieties were used interchangeably; in the second, the Obatá, Tupí, and Catimor varieties were used.

● Sampling places

Samples collection

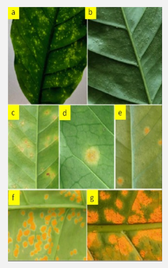
Inoculation



Skes scale

First trial

- Incubation period
- Latency period
- Mean latency period
- Infection frequency



Second trial

Classification (CIFC)

- Resistance
- Intermediate resistance
- Susceptible
- Intermediate susceptible

RESULTS/DISCUSSION

The genetic variability of different samples of *H. vastatrix* can explain the different degrees of aggressiveness found in this work (Table 1). In general, the results obtained for IP were less than report by Pozza et al. (2021) and Pires et al. (2020) who found IP of 25-30 days, even Kushalappa and Martins (1980) reported that IP can extend until 65 days. On contrary, the values of LP noticed in this work were in range of those ones reported by Toniutti et al. (2017) (21-37 days) and Maia et al. (2017) (17-50 days). The frequency of infection is the most effective method for assessing the damage caused by coffee leaf rust, as it involves counting pustules, providing a more precise and less subjective measurement.

Region		IP (days)	LP (days)	MLP (days)	IF (Scale 0-9)
Northern region	Min	17.00	20.40	22.00	4.00
	Max	18.20	30.04	33.28	9.00
	Mean	17.24	24.15	27.39	6.54
Central region	Min	14.40	18.12	22.69	1.20
	Max	25.60	32.68	36.45	8.80
	Mean	20.21	26.98	30.47	4.98
Southern region	Min	18.00	27.77	31.80	1.40
	Max	20.51	35.16	40.14	8.80
	Mean	18.73	30.04	34.75	6.62

Table1. Pathogenic variables evaluated in this study. IP: Infection period. LP: Latency period MLP: mean latency period. IF: Infection frequency.

We also noticed that three groups were formed. The composition of different groups (Figure 1) is explained by the movement of genetic material from different coffee-producers regions. In the second experiment, Obatá presented resistance to the rusts of North, Centre and South (Table 2).

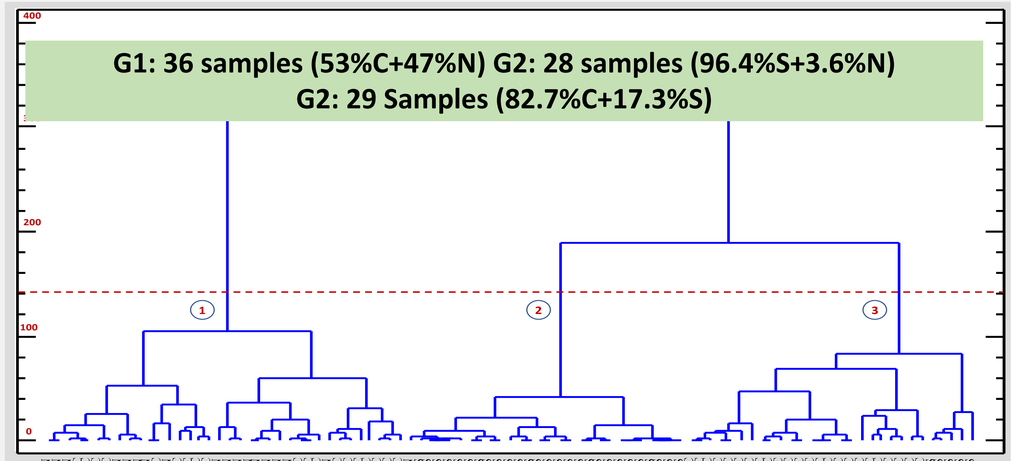


Figure 1. Cluster of the different rust collected in this study, in Peru.

Genotype	Region	Resistance	Intermediate Resistance	Susceptible	Intermediate Resistance
Obatá	Northern region	100.0%	0.00%	0.00%	0.00%
	Central region	100.0%	0.00%	0.00%	0.00%
	Southern region	100.0%	0.00%	0.00%	0.00%
Tupí	Northern region	96.70%	2.20%	0.00%	0.00%
	Central region	98.90%	0.00%	0.00%	0.00%
	Southern region	100.0%	0.00%	0.00%	0.00%
Catimor	Northern region	20.00%	26.70%	25.40%	27.80%
	Central region	54.30%	22.90%	0.00%	22.80%
	Southern region	100.0%	0.00%	0.00%	0.00%

Table 2. Reaction of cresistant cultivars of coffee to different rusts

CONCLUSION

- ❑ There is pathogenic variability of the fungus *Hemileia vastatrix* present in coffee plantations of the Peruvian rainforest.
- ❑ The Obatá variety was resistant to all types of coffee leaf rust collected in this study.

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