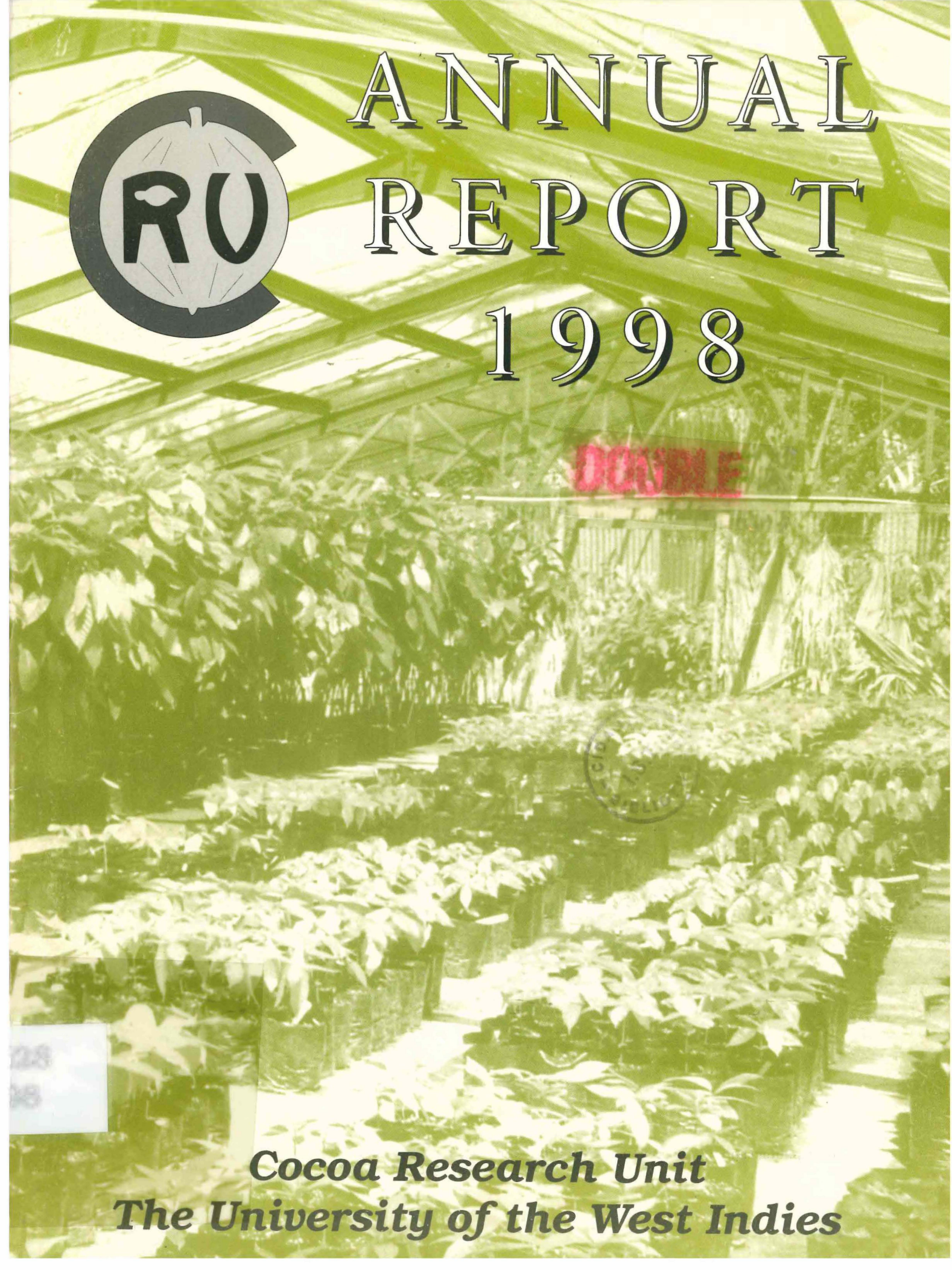

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Cover photograph. Cacao seedlings in the germplasm enhancement programme.

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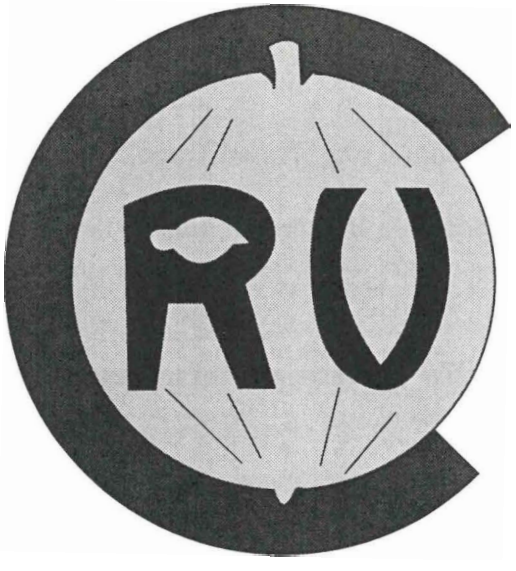

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Field Assessment of Cacao Germplasm for Resistance to Witches' Broom and Black Pod Diseases

J-M. Thévenin, R. Umaharan, B. Latchman, and S. Surujdeo-Maharaj

Introduction

Witches' Broom and Black Pod diseases are two of the major disease constraints faced by cocoa producers. Black Pod occurs worldwide and accounts for average yield losses of about 20%, while Witches' Broom disease has been reported to cause 30–50% yield losses in South America and the Caribbean (Evans and Prior, 1987) and may reach 90% (Rudgard, 1986).

Currently, germplasm enhancement activities are being undertaken at CRU, as part of the CFC Cocoa Project aimed at obtaining populations with increased disease resistance. Since the ICG,T contains a vast source of genetic variation for such economically useful traits as disease resistance, field evaluation of selected clones for resistance to Witches' Broom and Black Pod diseases is being undertaken.

Procedure for field assessment

A total of 228 clones have been selected for field evaluation at the ICG,T. Depending on the availability of plants, 1-5 trees per clone have been tagged. Observations started in October 1998 and are being made on the tagged trees.

Witches' Broom

From the selected clones, three branches each averaging about 5 feet in length were selected per tree. On each branch, observations listed below are made on the shoots and cushions three times per year:

Shoots

- Healthy axillary/terminal shoots
- Axillary/terminal green brooms
- Axillary/terminal dry brooms

Cushions

- Healthy cushions
- Cushions (flowers and cherelles) showing symptoms
- Green brooms
- Dry brooms

Pests and diseases of pods

Each tree is observed every month, ripe pods are harvested, and the following variables are recorded:

Ripe pods

- Whether healthy
- Presence of Black Pod symptoms, without Witches' Broom, in association with, or without other fungi, insects, rodents, or bird attacks
- Witches' Broom symptoms, without Black Pod, in association with, or without, other fungi, insects, rodent or bird attacks
- Presence of both Black Pod and Witches' Broom symptoms on the same pods, in association with, or without other fungi, insects, rodent, or bird attacks

Unripe fully grown pods

- Whether healthy
- Presence of Black Pod symptoms

Cherelles

General observations of the cherelles (small, immature pods), to determine whether they are rotted or healthy and whether they have symptoms of Black Pod or Witches' Broom. Each tree will be rated on the following scale:

0 - No symptoms
1 - Slightly affected
2 - Moderately affected
3 - Heavily affected

Due to the planting layout at the ICG,T (one plot per accession, without replication), these field observations will be used to confirm the resistance level from laboratory screening, to eliminate susceptible clones and to identify possible sources of resistance. These will be confirmed in the laboratory. Field observations are scheduled for the first 3 years of the CFC Cocoa Project. After the first year, observations will be discontinued on susceptible clones (except for controls) and these will be replaced by a new set of accessions. Where resistance from field assessment is supported by laboratory screening, accessions will be considered for use in breeding schemes, with priority given to those with other interesting traits.

References

Evans, H.C. and Prior, C. (1987) Cocoa pod diseases: causal agents and control. *Outlook on Agriculture* **16**: 35-41.

Rudgard, S.A. (1986) Witches' Broom disease of cocoa in Rondonia, Brazil: Pod losses. *Tropical Pest Management* **32**: 24-26.