

CSSD: Epidemiology and Control

Epidémiologie et Contrôle

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Epidemiology

Epidémiologie

“The study of disease in host populations”

“L'Etude la maladie dans la population d'accueil”

Epidemiology: A Quantitative Science

Epidémiologie Une Science Quantitative

- Disease prevalence/severity
- Means of spread
- Temporal patterns of spread
- Spatial patterns of spread
- Rates of spread
- Sources of inoculum
- Alternative hosts
- Crop loss

CSSD Epidemiology: Sources of Information

CSSD Epidémiologie Sources d'Information

Detailed long-term observations

- Farmer plantings
 - e.g. Old Station, Tafo
 - Koransang and elsewhere, Gh.
 - Koroboto, Nigeria
- Block plantings, Ghana
- Research trials
 - Planned experiments: Gh./Nig.
 - BRT, Ghana
 - Coppicing trials:Gha./Nig.
- Field maps/observations
 - Survey teams Ghana/Nigeria

Planned Experiments

Expériences Plannifiées

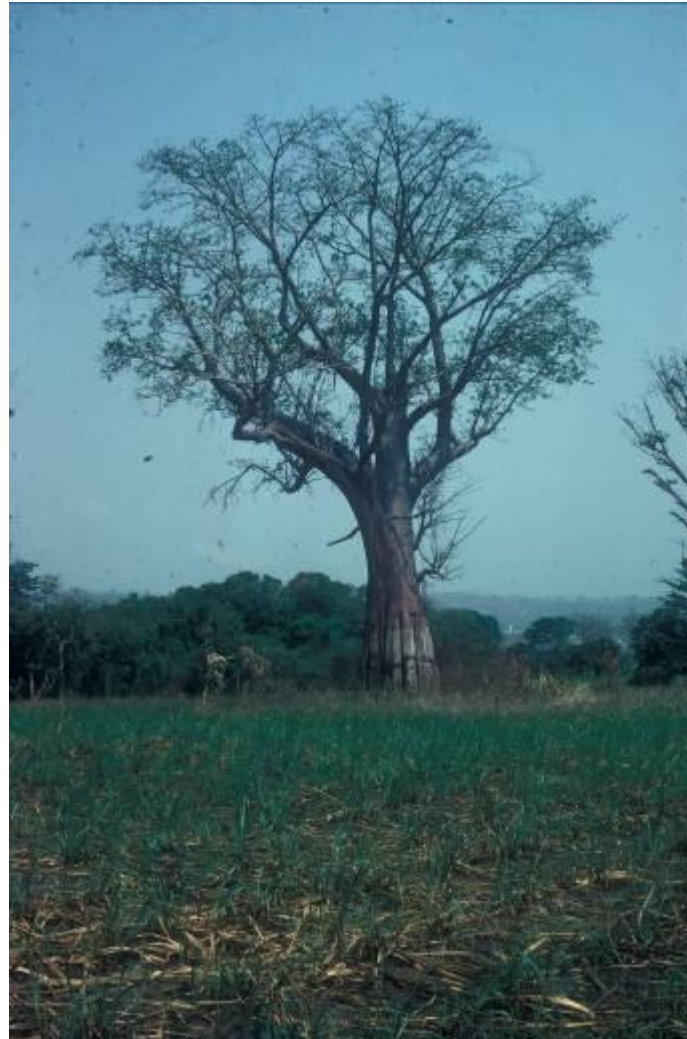
- Rate of Spread
- Effect on yield
- Mild strain protection
- Evaluation of resistance
- Barrier crops
- Effectiveness of insecticides

Sources of Infection

Expériences Plannifiées

- NOT seed
- Indigenous tree hosts
- Cacao (plantation/abandoned)
- Herbaceous hosts?

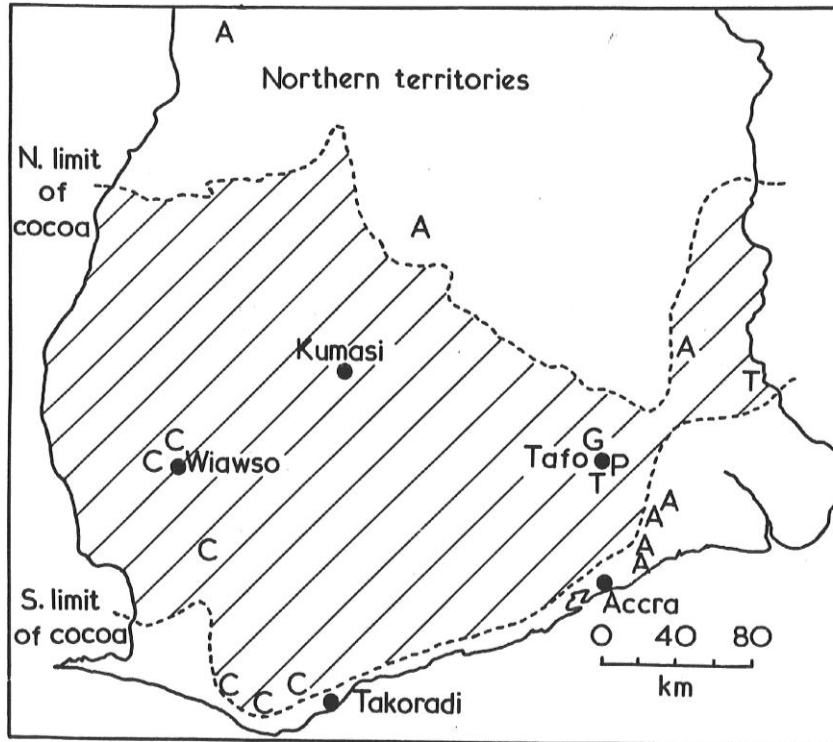
CSSV: Indigenous host Baobab(*Adansonia digitata*)



Silk cotton (*Ceiba pentandra*)



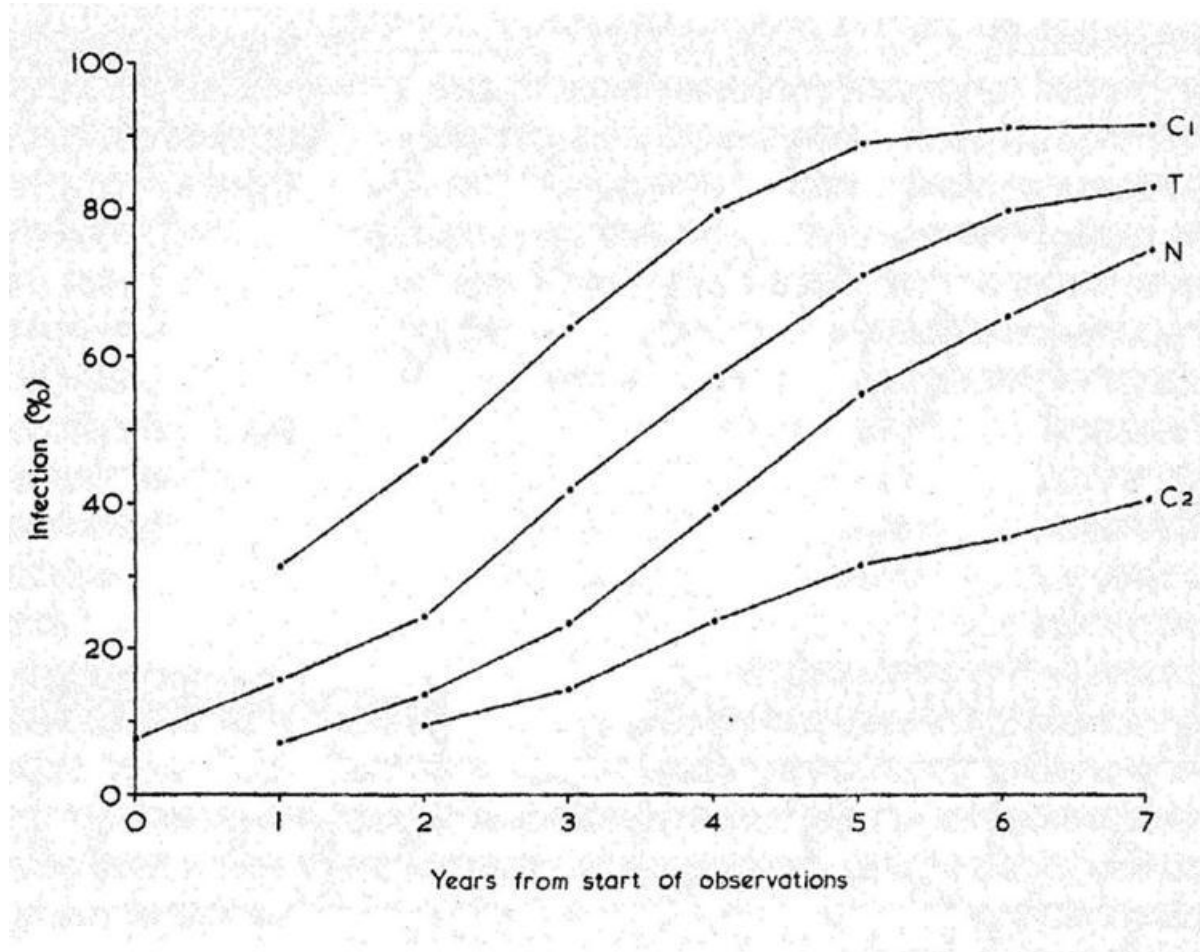
CSSV in Indigenous Forest Trees in Ghana



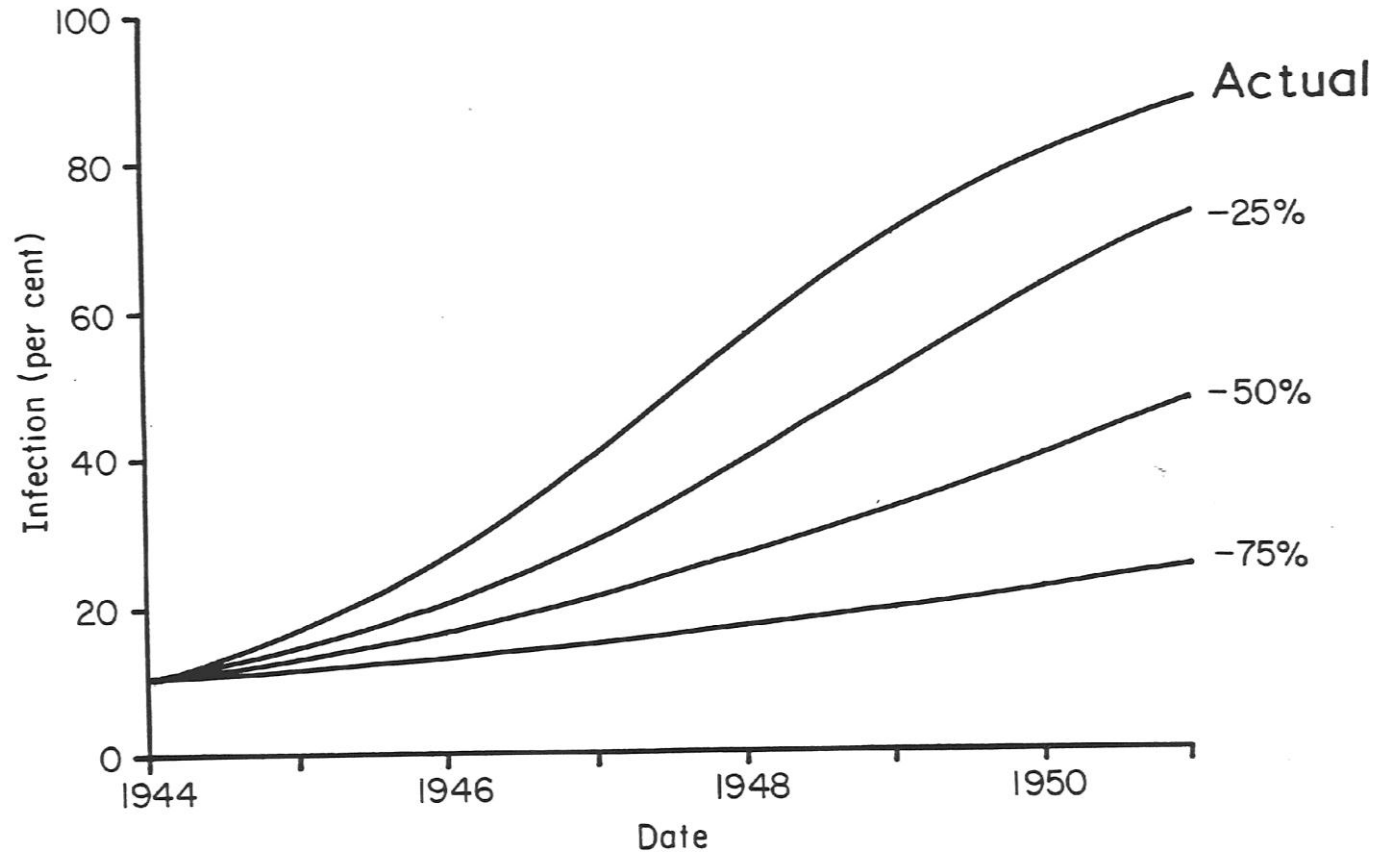
Naturally infected : A *Adansonia digitata*
P *Ceiba pentandra* C *Cola chlamydantha*
T *Sterculia tragacantha* G *Cola gigantea*

Temporal Patterns of Virus Spread

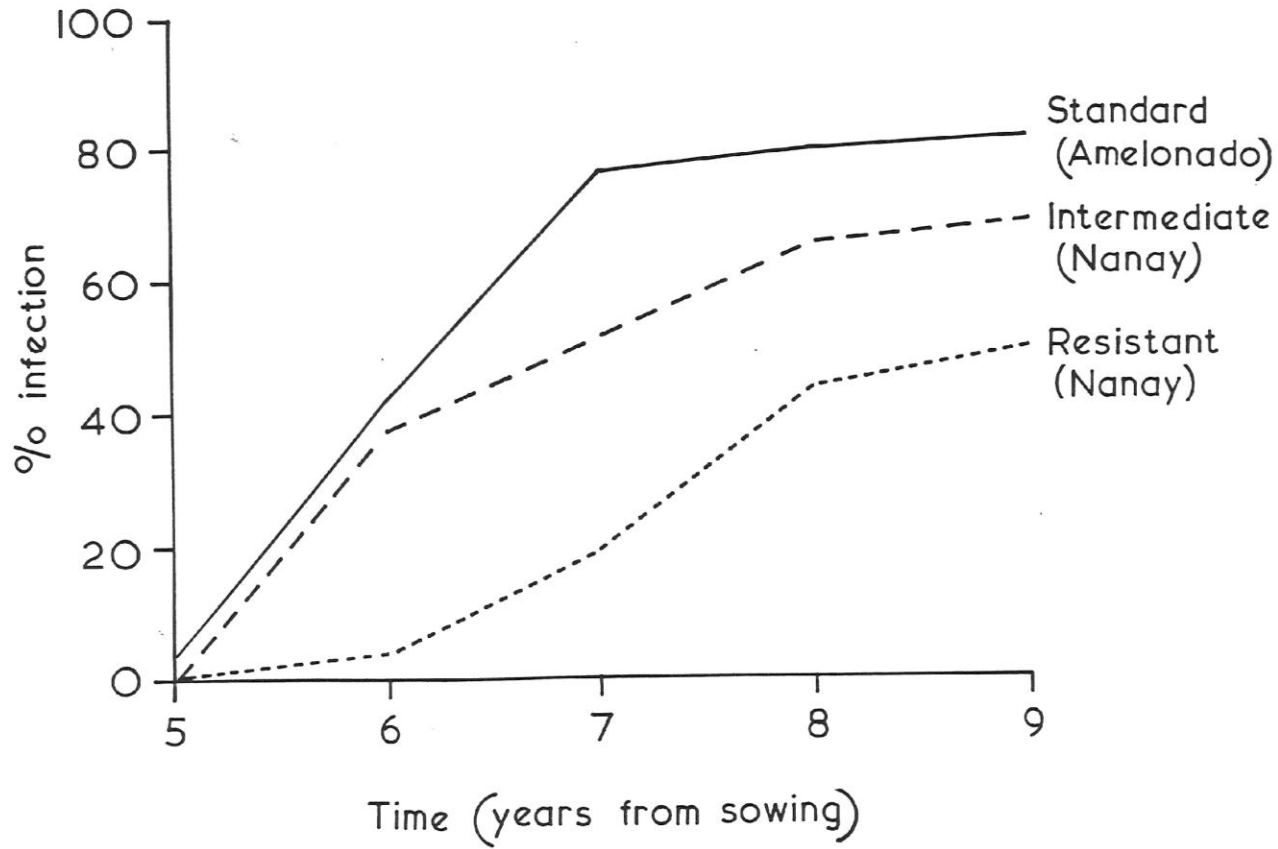
CSSD: Disease progress curves: Nig./Gh./Trin. Courbes Qui Illustrent La Progression De La Maladie



Mealybug-transmitted cocoa virus in Trinidad: Spread at different rates

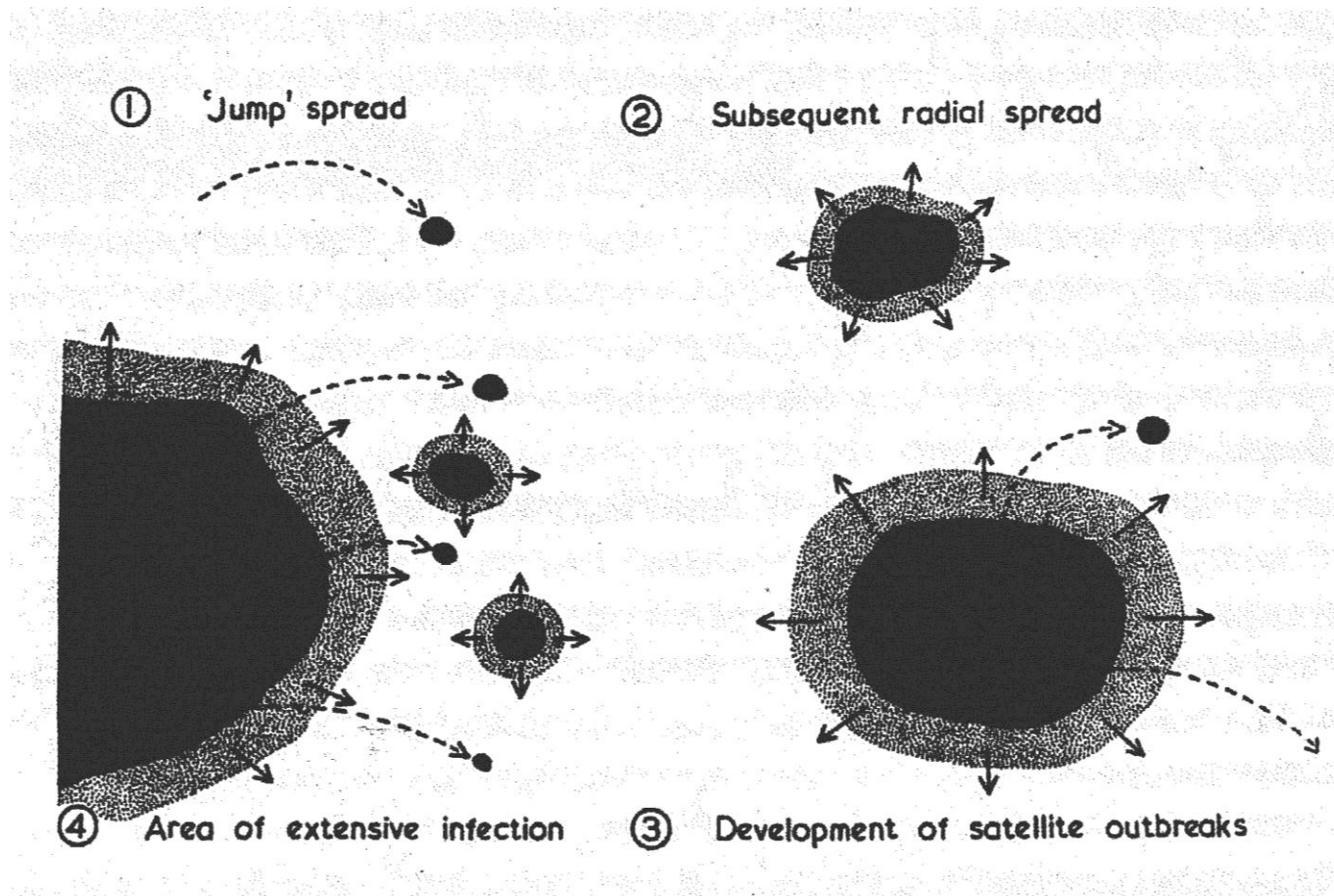


Spread of Cocoa Swollen Shoot Virus in Ghana (Kenten & Legg 1971)



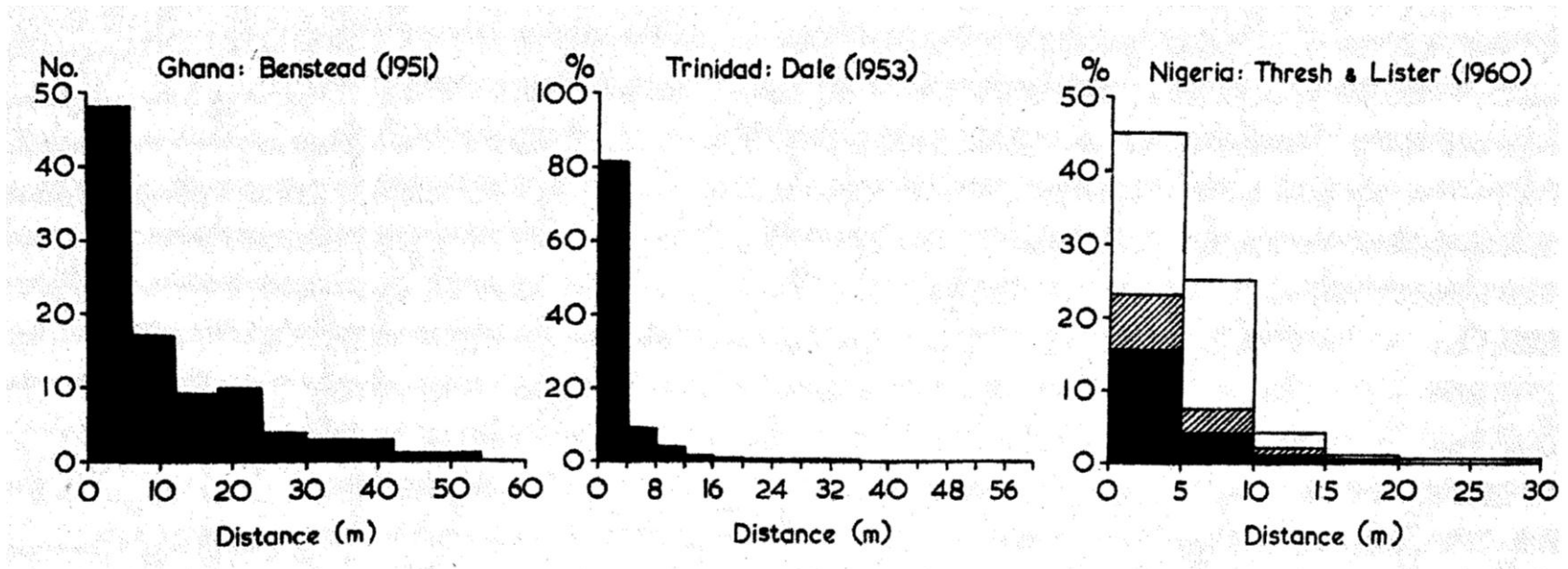
CSSD: Pattern of Spread

Motifs de Progression

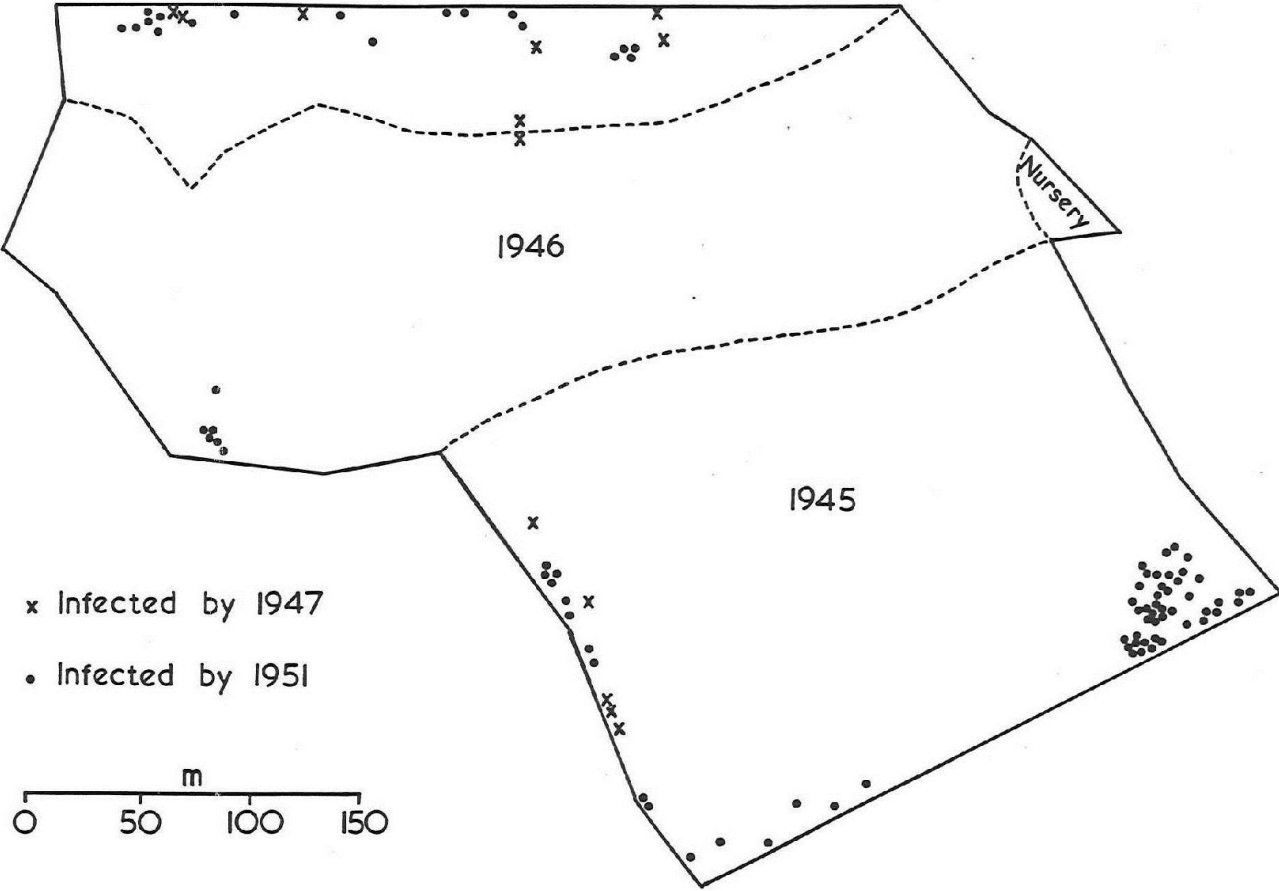


CSSD: Gradients of Infection

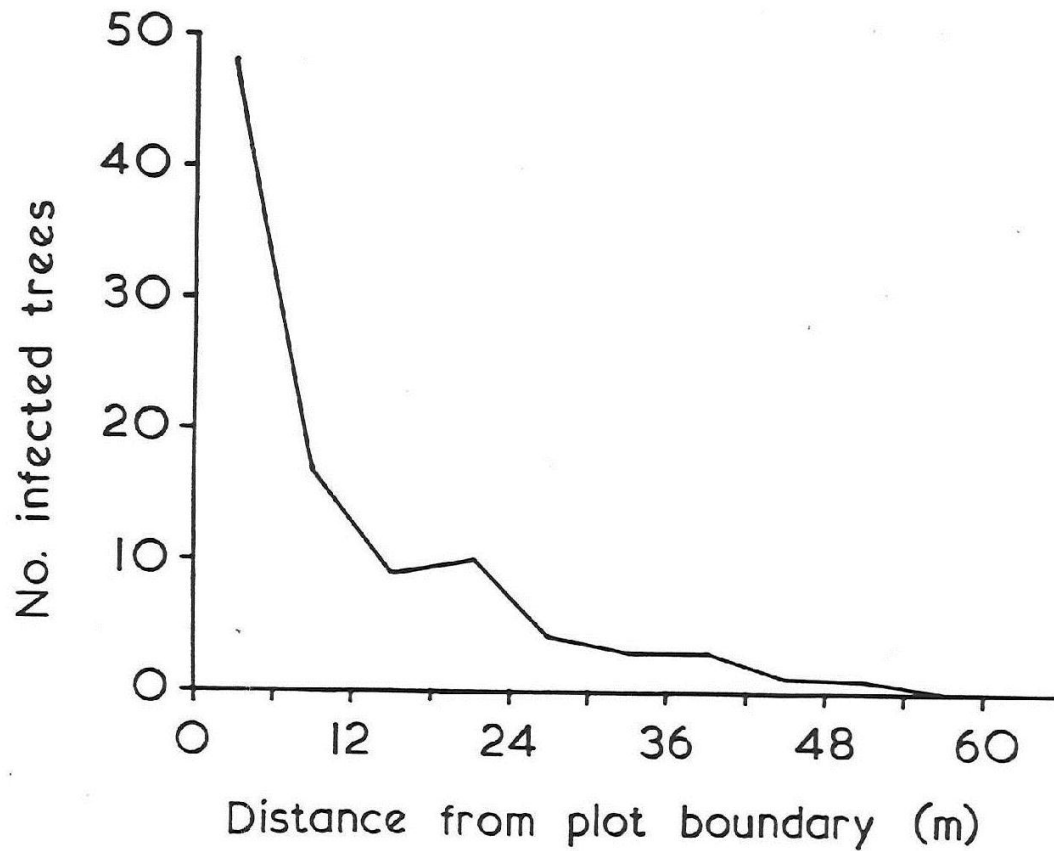
CSSD: Gradients de l'Infection



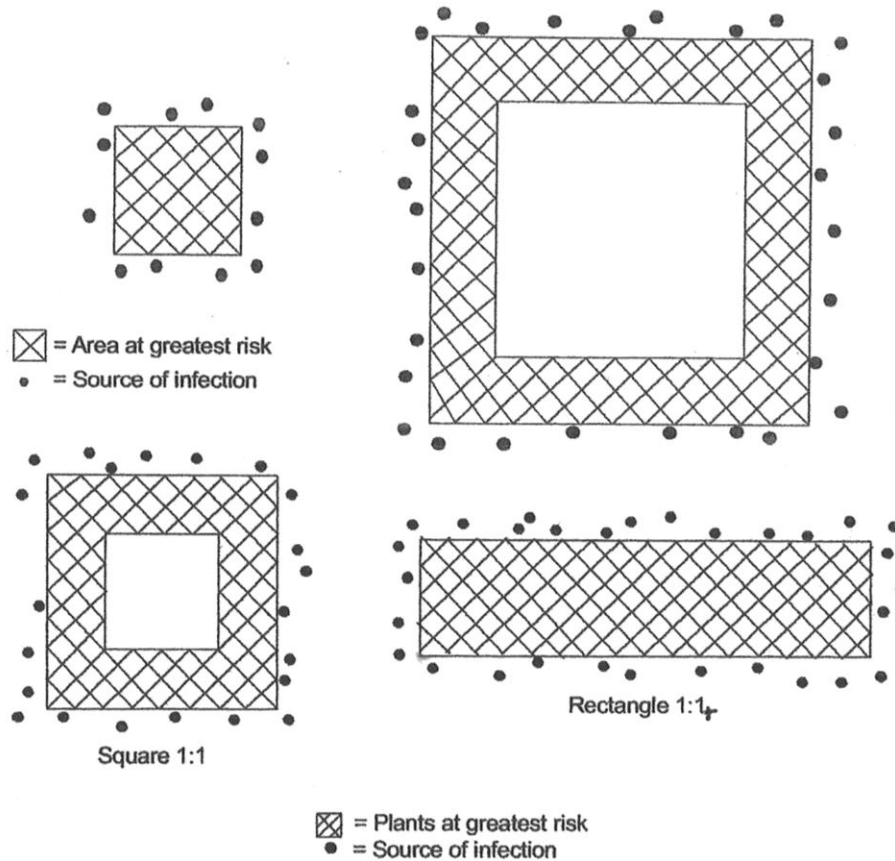
Infection in 1945/1946 Adonkwonta Block Planting



Cocoa Swollen Shoot Disease: Adonkwonta 6 years after re-planting



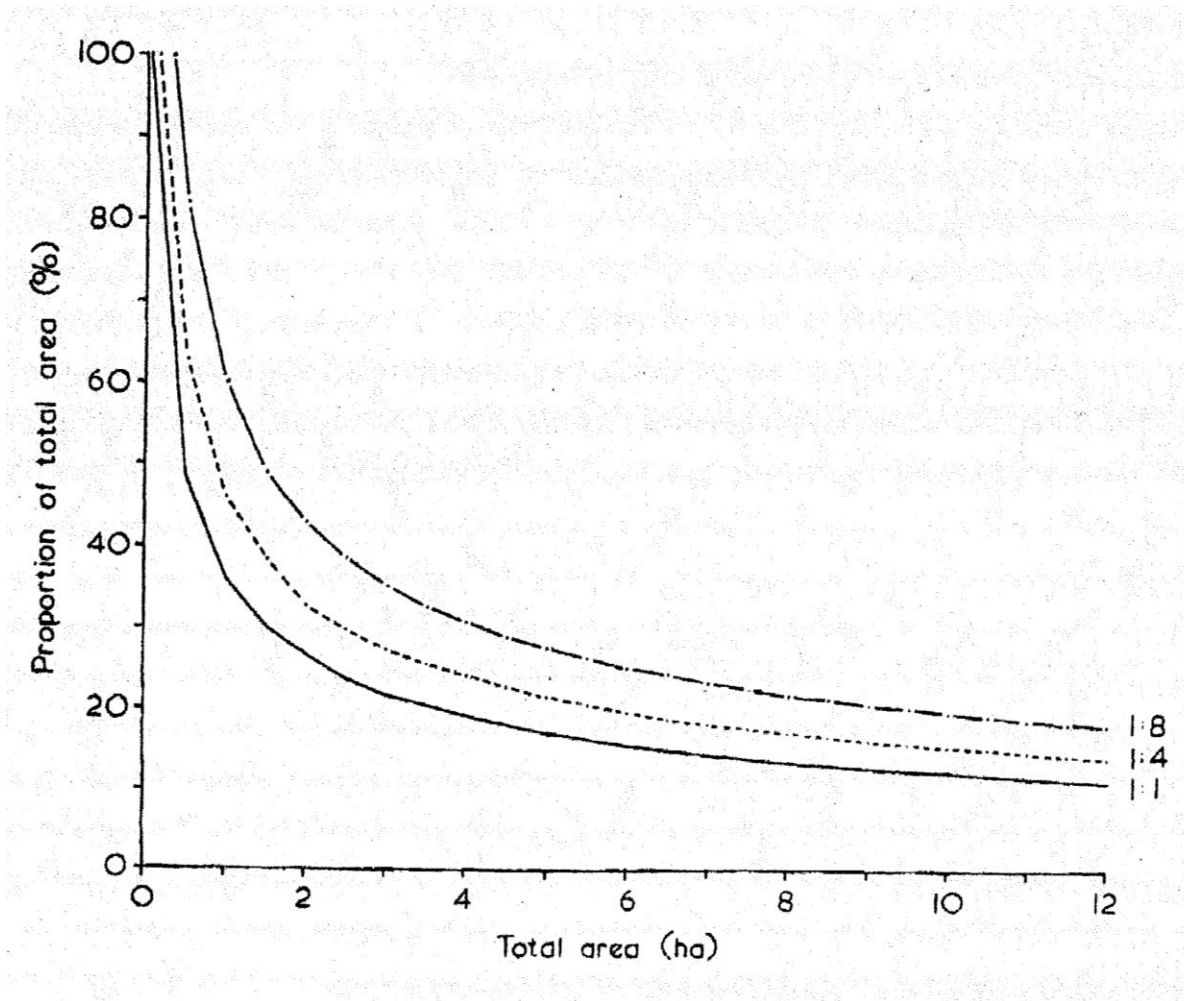
Influence of Plot Size and Plot Shape



The influence of plot/field size (top) and shape (bottom) on virus spread from surrounding sources of infection.

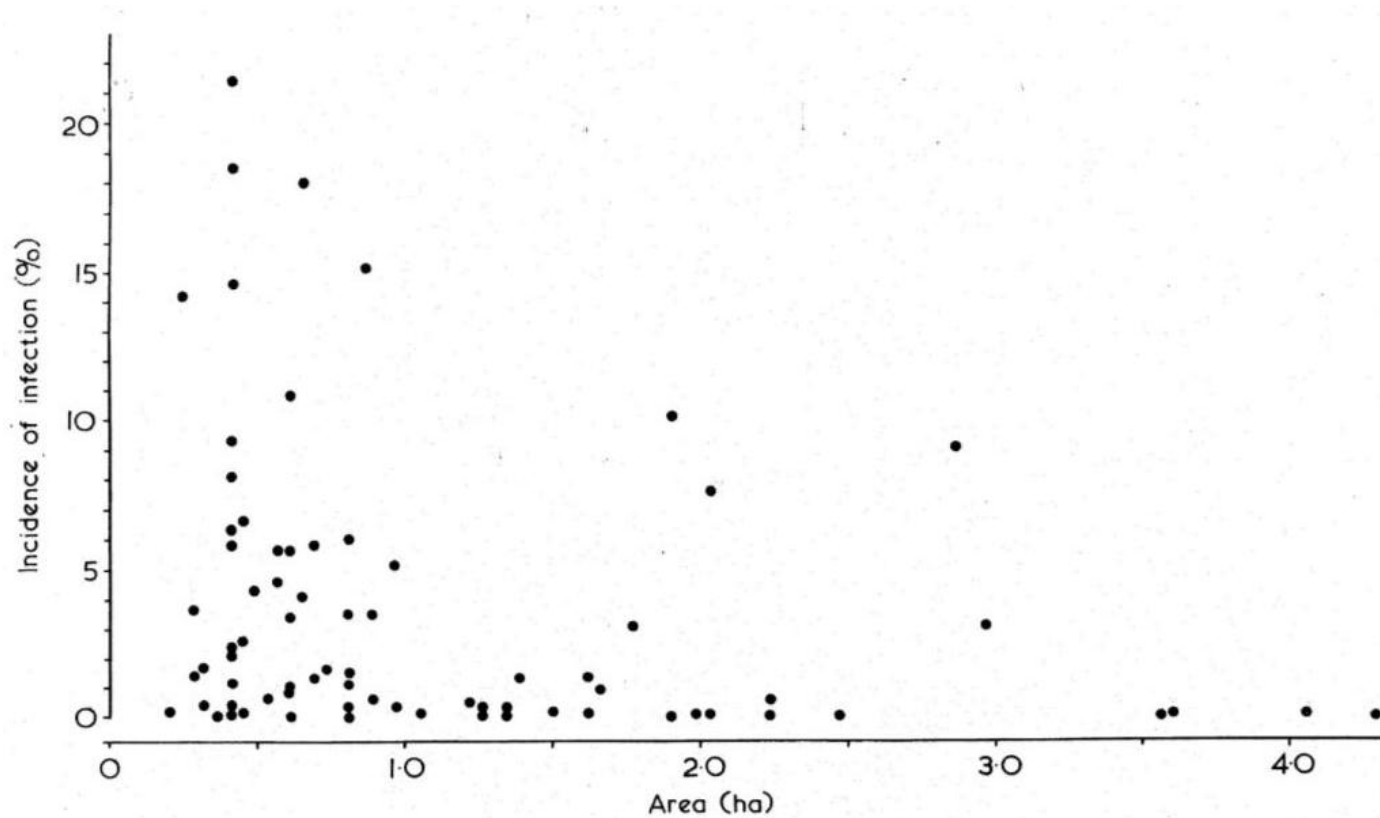
Plot margin as percentage of total area

Marges de tracé en pourcentage de la superficie totale



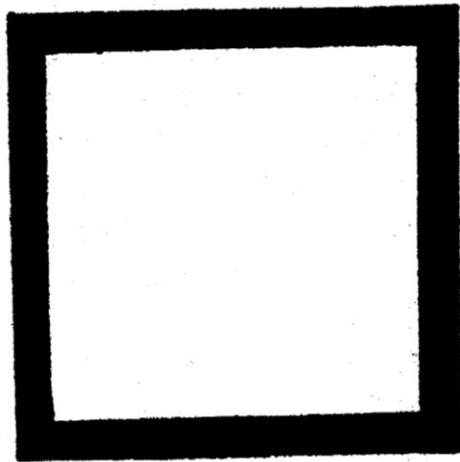
Incidence of infection in relation to plot size

Incidence de l'infection par rapport à la taille de la parcelle

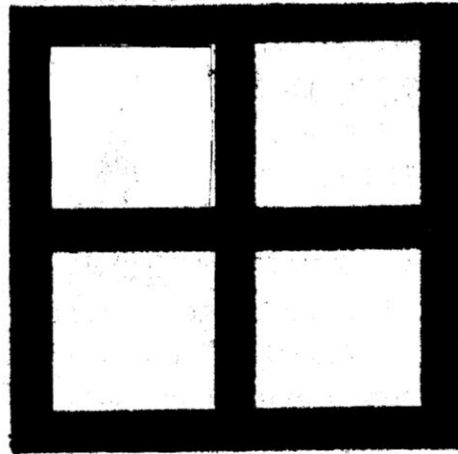


Possible Arrangement Of Barrier Crop Or Unplanted Area

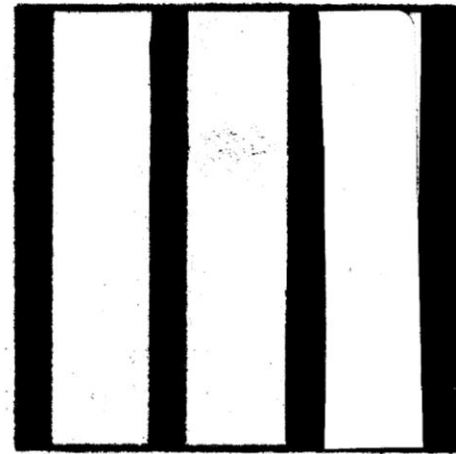
Arrangement Possible D'une Plantation Agissant de Barriere ou Alors d' Une Zone Non Ensemencee



a



b



c

Epidemiology: the Crucial Findings

Epidémiologie: Les Découvertes Cruciales

- CSSD is a "crowd disease" - "one that does not spread far in any considerable amount"
Therefore amenable to control by eradication
- Trees at margins of plantings are at greatest risk

Epidemiology: the Crucial Findings

Epidémiologie: les conclusions cruciales

- Nearby sources of inoculum are greatest threat
- Plantings should be compact and large
NOT small or of irregular shape

Epidemiology: the Crucial Findings

Epidémiologie: les conclusions cruciales

- "Quantitative" (partial) resistance highly beneficial and should be deployed

Conclusion

CSSD can and should be controlled.
CSSD Peut et Doit être Contrôlé

However, this is only possible if control measures and cropping systems are based on sound epidemiological principles