

FIGHTING LETHAL YELLOWING DISEASE FOR COCONUT FARMERS

CÔTE D'IVOIRE FARMERS FINALLY KNOW WHAT'S KILLING THEIR COCONUTS—AND HOW TO CONTROL IT

WHAT CANADIAN AND IVORIAN COLLABORATORS DISCOVERED:

- CILY phytoplasma, the bacterial parasite culprit behind this mysterious disease
- A new leafhopper insect that may transmit the disease between coconut palms
- Weeds on coconut farms that also host the CILY phytoplasma
- Robust diagnostic tools to quickly detect the disease and identify the bacterial parasite
- Practical and environmentally friendly field practices to control disease spread, and increase coconut crop productivity and profitability
- Nine local coconut cultivars and hybrids for long-term disease resistance screening
- New income-generating activities for farmers, particularly women
- Gender-responsive approaches to engage farmers, stakeholders and policymakers in disease management and control strategies
- New tool to predict land use change and to help re-allocate the areas devastated by the disease

BY THE NUMBERS

- 1,960 farmers (1,568 men and 392 women for around 700 families) and 180 extension agents trained at 10 field schools
- Over 670 farmers, villagers and processors (478 men, 193 women) participated in 9 plant clinics
- 550 participants (390 men, 160 women) attended 8 Women Coconut Fairs; the number and diversity of coconut products increased 64% from 2015 to 2016
- Over 300 women involved in Women Groups in 6 villages planting cassava yards as a new source of income

THE IMPACT:

For the first time, farmers in the Grand-Lahou region of Côte d'Ivoire have answers for what has been destroying their coconut crops. More importantly, they now have the knowledge and tools to: early detect, identify and control this lethal bacterium; establish a healthy seednut supply; and generate revenue from other crops and coconut products to compensate for lost revenues. These innovative and practical approaches are empowering farmers, particularly women, to improve their family income and nutrition.

THE CHALLENGE:

Côte d'Ivoire lethal yellowing (CILY) disease had already killed over 400 hectares of coconut groves in the country's coastal region of Grand-Lahou – one of the world's top 20 coconut producers. Without prompt action, the disease was forecast to decimate the country's coconut crop by 2020. The local economy heavily depends on coconuts for jobs and the majority of these jobs are held by women; they provide 80% of food production and 60% of marketing and labour in the coconut production chain. Coconuts are an important source of livestock feed, nutrition and income to pay for children's food, schooling and clothing.



TRANSLATING RESEARCH INTO ACTION

The challenge required a two-pronged approach to the research: one that involved a private sector-led multidisciplinary team of experts from Canada and the academic and research sector of Côte d'Ivoire and Ghana to understand and control the outbreak; and one that continually shared new information so that authorities, policymakers, stakeholders and farmers could act immediately to control CILY.

Identifying the disease and how it spreads

“If you see the straw becoming yellow you know that the disease has begun.”

Koffi Ayekpa Andrienne, Farmer, Ebome Efrauassome Field School

- Identified a bacterial parasite, called phytoplasma (16SrXXII-B) associated with CILY in all the affected villages. (Initial causes of the disease were thought to be a virus or fungus.)
- Identified a new leafhopper insect (*Nedotepa curta*) that may transmit the CILY phytoplasma to coconut palms and other plant species.
- Identified microbes that live within plants (endophytes) and in the soil with the potential to naturally strengthen the plant's defence against CILY.
- Identified a new species of parasitoid (tiny insect that parasitizes the leafhopper's eggs) which could prove a more feasible and practical tool to control *Nedotepa curta*. As rearing parasitoids is both fast and easy, it could provide a new source of income for farmers.
- New technique – ‘slow down’ (fell tree at early stage) – transferred from Ghana to Côte d'Ivoire to contain CILY.
- Removing weeds that host the CILY phytoplasma reduced the disease's spread to coconut palms.

Testing and scaling up practical solutions

“We have taught farmers good field practices for cultivating the coconut, detecting the alternative hosts of the phytoplasma and growing plants in the areas affected by the disease.”

Dr. Marie Noel Toualy, UNA Researcher

- A new technology (using loop-mediated isothermal amplification, or LAMP) to detect the disease early and fast in the field was transferred to the National Centre of Agronomic Research and the University Nangui Abrogoua in Côte d'Ivoire.
- New information developed and translated into a new disease management plan and fact sheets; a three-year rehabilitation plan; an environmental and mitigation plan for CILY; a farmer field mini-guide and policy briefs for farmers (to identify the disease and control its spread), stakeholders and policymakers.
- Established field schools to train farmers and extension agents on proper coconut farming, marketing, disease management, and seedling supply.
- Know-how in establishing coconut nurseries, controlling seed exchange, and managing resistance trials.
- Demonstrated how intercropping with banana, applying poultry manure, and selling coconut products (i.e., from felled diseased palms) can help farmers, particularly women, increase incomes, coconut crop productivity, and their family's nutrition.

Empowering women and other local stakeholders:

The project team has achieved titanic, scientific and practical outcomes in a very short time that will help the community of Grand-Lahou, particularly women and young people.”

Dr. Yaima Arocha Rosete, Plant Pathologist, Sporometrics

- As a result of the project, field schools, plant clinics, Women's Groups and Women Coconut Fairs have become common practices adopted by the coconut farming community of Grand-Lahou with the support of ANADER (Côte d'Ivoire's National Agency for Rural Development) and extension agents.

- Field schools and plant clinics enabled farmers, particularly women, to access technical support, training and advice.
- Plant clinics mobilized over 670 farmers, villagers, producers and processors who are willing to pay consultation services to plant doctors. Young farmers see plant doctors as a new local job source.
- For the first time, women coconut farmers in Grand-Lahou organized themselves into women's groups which provide training on coconut farming and maintenance, land preparation, and processing and marketing. The initiative resulted in women planting cassava in areas devastated by the disease as a new source of income.

WHAT'S NEXT?

The research team demonstrated that field schools, plant clinics, Women Coconut Fairs and Women Groups are the most effective tools to raise disease awareness among farmers, stakeholders and policymakers, to manage and control CILY, and to improve the livelihoods of the coconut smallholder farmers in Grand-Lahou, particularly women. An action plan has been developed to continue scaling up these activities to 2020. Ongoing field trials in Côte d'Ivoire and Ghana will continue to identify local palm varieties resistant to CILY and the best approaches to support the rehabilitation of the coconut industry in Côte d'Ivoire.

LEARN MORE ABOUT THIS PROJECT:

Project abstract: www.idrc.ca/en/project/fighting-lethal-yellowing-disease-coconut-farmers-cifrsf-phase-2

Project website: <http://cowaly.com>

Research in Action: <https://www.idrc.ca/en/research-in-action/fighting-lethal-yellowing-disease-coconut-farmers>

KEY OUTPUTS

POLICY BRIEFS

Policy Brief for CILY environmental and mitigation plan in Grand-Lahou (EN and FR) COWALY 01/08/2016 Yaima Arocha Rosete, Hortense Diallo, Jean Louis Konan Konan Sporometrics, UNA, CNRA <https://idl-bnc-idrc.dspacedirect.org/handle/10625/56424>

Policy Brief to disseminate good cultural practices in Grand-Lahou (EN and FR) COWALY 01/08/2016 Yaima Arocha Rosete, Hortense Diallo, Jean Louis Konan Konan Sporometrics, UNA, CNRA <https://idl-bnc-idrc.dspacedirect.org/handle/10625/56428>

JOURNAL ARTICLES

Detection and differentiation of the coconut lethal yellowing phytoplasma in coconut-growing villages of Grand-Lahou, Cote d'Ivoire Annals of Applied Biology 07/02/2017 Y. A. Rosete, H. A. Diallo, J. L. Konan Konan, N. Yankey, M. Saleh, F. Pilet, N. Contaldo, S. Paltrinieri, A. Bertaccini & J. Scott Sporometrics, UNA, CNRA, CSIR-OPRI, CIRAD, Univ of Bologna, Univ of Toronto <https://idl-bnc-idrc.dspacedirect.org/handle/10625/56417>

Detection and identification of the coconut lethal yellowing phytoplasma in weeds growing in coconut farms in Cote d'Ivoire Canadian Journal of Plant Pathology 01/05/2016 Y. Arocha Rosete, H. ATTA Diallo, J.L. Konan Konan, A.E.P. Kouame, K. Seka, K.D. Kra, M.N. Toualy, K.E. Kwadjo, W.A.M.P. Daramcoum, N.I. Beugre, B.W.M. Ouattara,

C.G. Kouadjo Zaka, K. Allou, N.D. Fursy-Rodelec, O.N. DoudjoOuattara, N. Yankey Sporometrics, UNA, CNRA, \, Univ of Toronto <https://idl-bnc-idrc.dspacedirect.org/handle/10625/56419>

Field schools and plant clinics: effective agricultural extension approaches to fight the coconut lethal yellowing disease and improve livelihoods of smallholder farmers in Grand-Lahou, Cote d'Ivoire International Journal of Agricultural Extension and Rural Development 12/03/2017 Kouame Daniel Kra, Taky Hortense Atta Diallo, Marie Noel Toualy1, Koffi Eric Kwadjo, Koulou Epse Yoboua Nazaret, Yadom Yao Francois Regis Kouakou, Assiri Elloh Patrice Kouame, Koutoua Seka, Bognan Winnie Miyasi Ouattara, Jonas Guei Ibo, Jean Louis Konan Konan, Yaima Arocha Rosete UNA, CNRA, Sporometrics <https://idl-bnc-idrc.dspacedirect.org/handle/10625/56434>

Socio-economic impact of the coconut lethal yellowing disease on Ivorian smallholder coconut farm families African Journal of Agricultural Economics and Rural Development 02/09/2016 Mahyao Germain Adolphe, Ismael Mourifie, Jean Louis Konan Konan, Jonas Guei Ibo, Nazarette Koulou, Hortense Atta Diallo, Kouassi Allou, Kristine White, James Scott and Yaima Arocha Rosete CNRA, Univ of Toronto, UNA, Univ of Bologna, Sporometrics <https://idl-bnc-idrc.dspacedirect.org/handle/10625/56435>

OTHERS

Coconut lethal yellowing in Grand-Lahou, Cote d'Ivoire (EN and FR) - Farmer field miniguide - 2017 - Sporometrics, UNA, CNRA, University of Toronto, ANADR, Oil Palm Research Institute <https://idl-bnc-idrc.dspacedirect.org/handle/10625/56420>

Stories of change : approaches to fight lethal yellowing disease bear hopes for the smallholder coconut farmers of Grand-Lahou <https://idl-bnc-idrc.dspacedirect.org/handle/10625/56448>

Nouveau plan de gestion de la maladie CILY <http://hdl.handle.net/10625/56423>

View all related project outputs in the IDRC Digital Library

<https://idl-bnc-idrc.dspacedirect.org/browse?type=project&value=107789>

QUICK FACTS

Project location(s): Côte d'Ivoire, Ghana

Institutions: Sporometrics Inc. (Canada); Centre National de Recherche Agronomique (CNRA), Université Nangui Abrogoua (UNA) (Côte d'Ivoire)

Project website: <http://cowaly.com>

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