



Environmental and Mitigation Plans for CILY in Grand-Lahou.

Directed to farmers, extensionists, trainers and stakeholders (authorities, farmer organizations, traders, processors, NGOs).

CILY has had an important environmental impact in the coconut-growing areas of Grand-Lahou. Environmental management and mitigation plans have been developed to minimize such impact in the coconut-growing villages of Grand-Lahou follows. The purpose of the plans are to help the Grand-Lahou community to build local adaptation capacity, engage in climate smart decision-making at the community level, and create a feedback mechanism to inform national policy through a bottom-up approach in addressing the short- and longer-term environmental impacts of CILY.

The plans target resiliency recommendations and measures that will improve livelihoods of the poor-resource coconut farmers through a participatory community-level process that involve farmers, stakeholders and extensionists to prioritize resiliency measures and for post-project monitoring.

Summary of actions to achieve environmental compliance.

Action Area	Actions
Prepare compliance documents	<ol style="list-style-type: none"> 1. Draft formats of environmental reviews. 2. Draft formats for compensation and remediation. 3. Determine and approve priority activities. 4. Annual reports. 5. Review Workshop.
Capacity-building for environmental compliance	<ol style="list-style-type: none"> 1. Designate responsible staff. 2. Create information and QA/QC systems/databases for M&E reports. 3. Staff training and additional assistance.
Operate systems and databases	<ol style="list-style-type: none"> 1. Monitor and assist plan implementation. 2. Maintain pilot farms and trials. 3. Implement training modules for field schools. 4. Organize plant clinics to assess plan implementation.
Training	<ol style="list-style-type: none"> 1. Produce training materials, factsheets, manuals, brochures, etc. 2. Train farmers in 'slow down' and irrigation techniques, measures for moisture retention, prevent soil erosion, and plastic waste management.

Environmental plan recommendations

Care of young palms

1. Seedlings transplanted should be shaded and irrigated adequately during the summer months.
2. Provide staking so that winds may not uproot the young seedlings.
3. For the first two years after planting, irrigate the seedlings twice a week during the dry summer months.

Irrigation

1. Irrigate palms during warmer months in basins of 1.8m radius and 10-20 cm depth around the palm. Generally, an adult palm requires 600 to 800 L of water once in 4-7 days.
2. In coastal sandy soils, use sea water for irrigating only adult palms. Do not irrigate seedlings and up to 2 year old young palms with sea water.
3. Once started irrigation should be continued regularly and systematically.
4. Use drip irrigation, which is the best suited method of irrigation for coconut. It saves water, labour and energy.

Moisture Retention

1. Bury fresh or dried coconut husks around the palm to retain moisture in drought prone areas for about 5-7 years.
2. Bury husk either in linear trenches taken 3 m away from the trunk between rows of palms or in circular trenches taken around the palm at a distance of 2 m from the trunk.
3. Place husk in layers with concave surface facing upwards and covered with soil.
4. Trenches may be dug at 0.5 m wide and at the same depth.

Green manure and cover crops

- The following Green manure / cover crops are recommended for cultivation in coconut gardens to help increasing the organic matter content of the soil and prevent soil erosion. *Crotalaria juncea* (Sunnhemp); *Tephrosia purpurea*; *Gliricidia maculate*; *Calapagonium muconoides*; *Mimosa invisa*

Intercropping

1. Intercrop coconut to control weeds and provide soil aeration.
5. A variety of intercrops like pineapple, banana, yam, groundnut, chillies, sweet potato, tapioca and different vegetables can be raised in coconut garden.

- In older coconut plantations, cocoa, cinnamon, pepper, clove, and nutmeg can be grown as mixed crops.

Manuring

- Apply regular manuring from the first year of planting.
- For coconut 20 - 50kg of organic manure should be applied per palm per year when soil moisture content is high.
- Different forms of organic manures can be prepared on-farm for manuring: compost, farm yard manure, bone meal, fish meal, blood meal, neem cake, groundnut cake etc.
- Follow the table below for fertilizer schedule for the palms at different stages.

		Quantity of fertilizer to be applied (gm)				
Age of Palm	Nutrient dosage	Ammo. Sulphate	Urea	Super Phosphate (single)	Ultraphos/ Rock Phosphate	Muriate of Potash
Average Management:						
3 months	1/10 of full dose	165	75	95	60	115
1 year	1/3 of full dose	550	250	320	200	380
2 year	2/3 of full dose	1100	500	640	400	760
3 year onwards	full dose	1650	750	950	600	1140
Good management:						
3 months	1/10 of full dose	250	110	180	115	200
1 year	1/3 of full dose	800	360	590	380	670
2 year	2/3 of full dose	1675	720	1180	760	1340
3 year onwards	full dose	2000	1080	1780	1140	2010
Hybrid and high yielding palms under irrigated condition						
3 months	1/10 of full dose	490	220	280	180	335
1 year	1/3 of full dose	1625	720	930	600	1110
2 year	2/3 of full dose	3250	1450	1850	1200	2220
3 year onwards	full dose	4880	2170	2780	1800	3330
<p>Under rainfed condition: Same as that of good management under general recommendation.</p> <p>The full adult doze recommended for the rainfed tall is 0.34kg N, 0.17kg P and 0.68kg K. For the hybrids and irrigated talls: 0.5kg N, 0.34kg P and 1.0kg. K subject to changes in accordance with soil test and/or foliar data analysis.</p> <p>In addition to the above, 2-3 kgs of finely ground dolomite lime stone, or 0.5 kg. MgSO₄ per palm per year is recommended for acidic and light sandy soils, and in root wilt affected tracts. Dolomite should not be applied along with other fertilizers. MgSO₄ can be applied along with other fertilizers.</p>						

1. Removal of CILY-affected coconut palms

1. Perform weekly farm inspections for CILY symptoms (**Photo 1**).
2. Inform CNRA and UNA as soon as symptoms for any disease stage are spotted, and mark the palms with a red ribbon, or with paint as applicable.
3. Use machete or saw machine to remove palms showing stages 3 or 4 symptoms ('slow down' method).
4. Leave the felled tree in the farm unless it is going to be use for household purposes.
5. If applicable, cut the felled tree in pieces to use them as seats for the field schools, previous agreement with local farmers, extensionists of field school trainers. Alternatively, chop the fronds and transfer the chopped fronds to a capped bin used for compost.
6. Do not burn the felled tree to prevent any environmental impact. Phloem will be no longer active after the tree is felled, and will die off so will be the phytoplasma, so no effective transmission will occur.
7. Perform monthly weeding to keep the farm under low pressure of insect vector populations.
8. Remove weed species identified as alternative hosts of the CILY phytoplasma (see below).
9. Establish your on-farm nursery for your seedlings (see New Disease Management Plan).
10. Do not exchange seednuts or seedlings with other farms.
11. Intercrop coconut palms with corn, cassava, or banana to reduce pest attack and compensate from losses due to CILY.
12. Change cloths and disinfect field working materials with 0.5% sodium hypochlorite solution (supplied by CNRA or UNA) before visiting any non-CILY affected field.

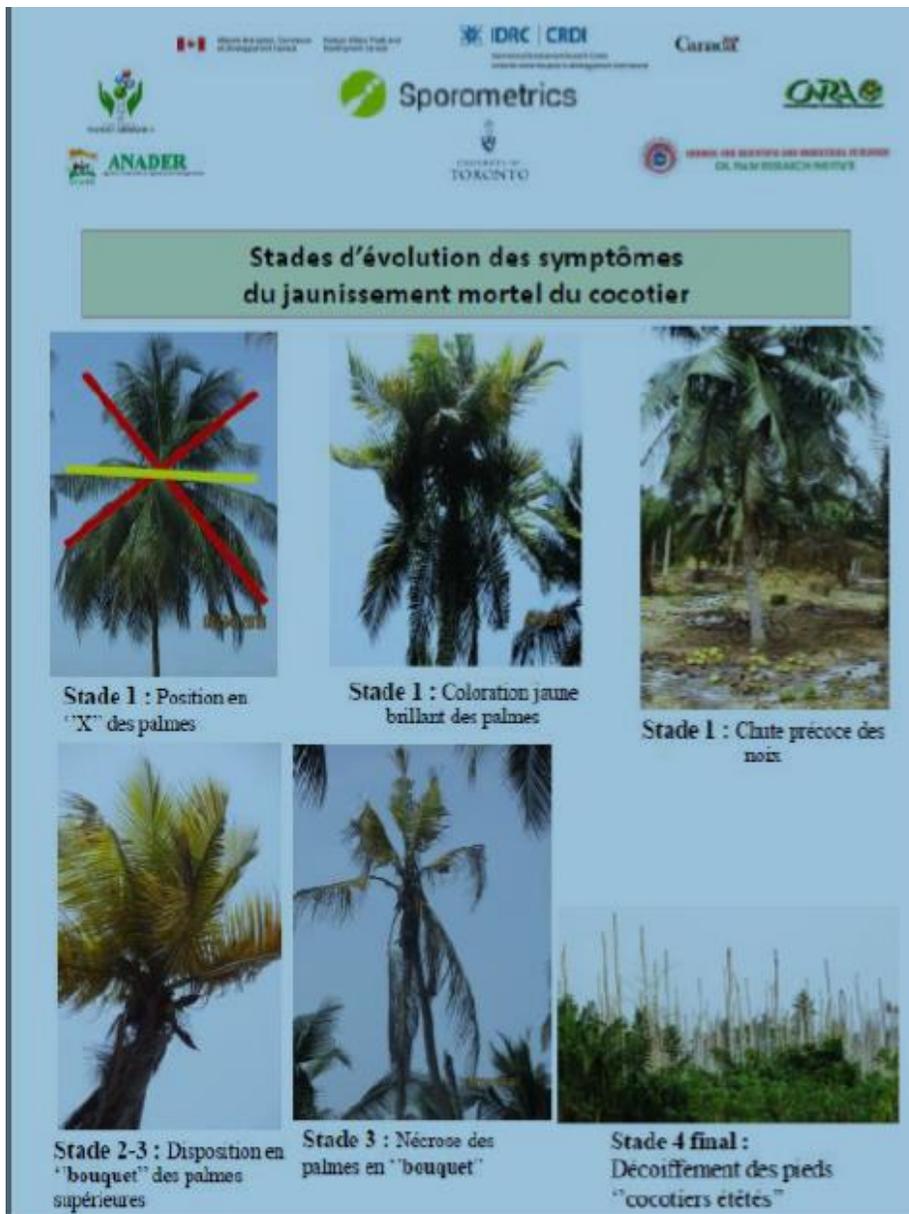


Photo 1. CILY symptoms corresponding to different stages of the disease.

Alternative hosts

1. Perform weekly inspections of the farm to spot the weeds (**Photo 1**).
2. Inform CNRA and UNA when weeds have been spotted.
3. Remove the weeds by uprooting.
4. Pile up the removed weeds in an area away from the coconut plantation and chop them all together with a machete.
5. Transfer the chopped weeds to a capped bin used for compost.

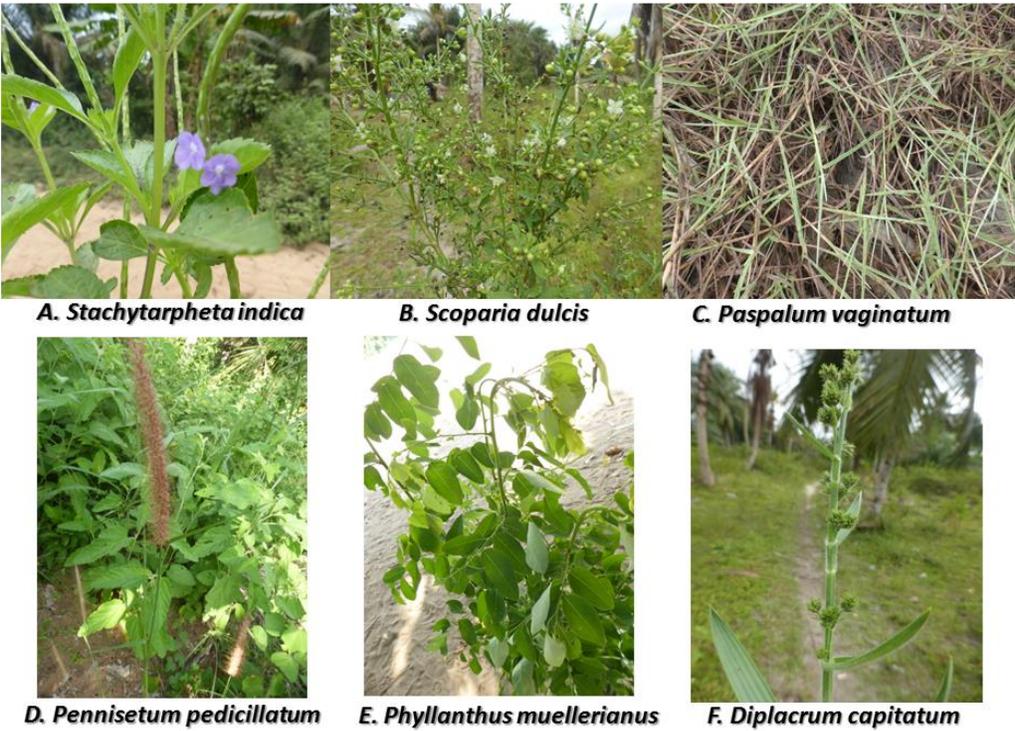


Photo 1. Weeds species alternative hosts for the CILY phytoplasma.

Plastic and metal waste management

1. Local farmers designated as responsible for the environmental assessment of the coconut farms in their corresponding village will monthly report to UNA and ANADER on the plastic and metal waste situation for each farm, including bottles, plastic bags, cans, non-used or broken appliances, etc.
2. Differential disposal sites for plastic and metal waste are recommended to be established in small areas of the land dedicated to each field school for each farm to implement the plastic and metal waste management plan.
3. UNA and ANADER will generate a plastic and waste management plan for Grand-Lahou that will be distributed to authorities, stakeholders, and policy makers.
4. UNA and ANADER will organize sensitization workshops for authorities, policy and decision makers to create awareness on the management plan and designate responsibilities for the control of the disposal sites.
5. Farmers will be informed and trained through field schools on how to collect the plastic and metal waste and how to manage the disposal site.

6. UNA and ANADER will train extensionists on plastic and metal waste management to assist farmers for the implementation and follow-up of the management plan.

Information Dissemination

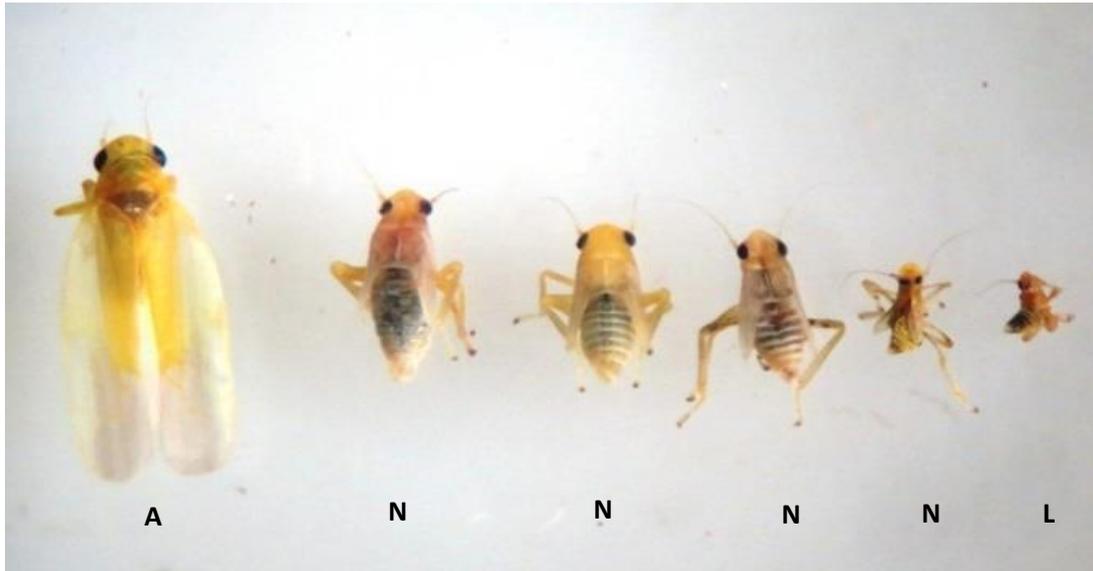
1. Monthly information community workshops are to be organized for farmers, stakeholders and authorities to inform and discuss about the progress of the plans' implementation and outcomes.
2. Factsheets with a summary of the environmental plan recommendations will be generated for farmers, stakeholders, extensionists and trainers through the field schools and plant clinics.
3. UNA and ANADER will generate progress reports on the implementation and outcomes of the environmental and mitigation plans to present to authorities, policy and decision makers of Grand-Lahou.
4. Local farmers will be designated as staff responsible for the environmental assessment of the coconut farms per village, and will receive a 3-day training by UNA and ANADER.
5. Training sessions will be organized per village with UNA and ANADER personnel to train designated farmers on how to conduct and report on the environmental assessment.
6. A three-monthly field school and plant clinic will be organized in selected villages for farmer awareness and follow-up on both the environmental and mitigation plans.
7. Plant doctors and field schools' trainers will report on attendance and conclusions of each field school and plant clinic held for the environmental and mitigation plans' follow-up.

Mitigation plan

Mitigation Measures to minimize environmental impacts	
Recognize potential impact	<ol style="list-style-type: none"> 1. Review activities with potential negative impact. 2. M&E of impact during implementation. 3. Report potential impact. 4. Information Workshop.
Prevent and control impact	<ol style="list-style-type: none"> 1. Identify and use best practices to prevent impact. 2. Modify/drop activity or technique. 3. Change location. 4. Database report.
Compensate for impact	<ol style="list-style-type: none"> 1. Offset adverse impacts in one area with extended improvements for the region.
Remediate Impact	<ol style="list-style-type: none"> 1. Repair or restore environment if damage is done.
Lessons learned	<ol style="list-style-type: none"> 1. Train staff and community from lessons learned. 2. Update systems, reports and plans based on lessons learned.

For Hemiptera, Cicadellidae specimens *Nzinga palmivora*, potential vector of the CILY phytoplasma.

7. Use the photo (**Photo 2**) to recognize the different stages of *Nedotepa curta*.
8. Perform weekly inspections to spot *N. curta* populations established in your farm.
9. Inform CNRA and UNA when a high number of *N. curta* has been spotted.



General guidelines:

1. Perform monthly inspections of the farm to spot coconut palms with symptoms of CILY.
2. Perform monthly weeding to keep the farm under low pressure of insect populations.
3. Remove weed species identified as hosts of the CILY phytoplasma.
4. Inform CNRA and UNA if CILY symptoms are spotted.
5. If the palm is confirmed as infected, remove it, burn it and bury it.
6. Establish your on-farm nursery for your seedlings.
7. Do not exchange seednuts or seedlings with other farms.
8. Intercrop coconut palms with corn, cassava, or banana to reduce pest attack and compensate from losses due to CILY.
9. Change cloths and disinfect field materials with 0.5% sodium hypochlorite solution before visiting any non-CILY affected field.