FACT SHEET

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How lessons learned from Cyclone Bola can help deal with the aftermath of Cyclone Gabrielle

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Tropical Cyclone Gabrielle severely hit the North Island of New Zealand on the second week of February 2023 causing extensive damage to the winegrape industry. However, this was not the first time New Zealand grape growers have experienced such a tragedy. On March 8, 1988, Cyclone Bola caused extensive damage to the North Island in the regions of Gisborne and Northland. Destruction caused by both cyclones were similar in many respects: flooding, silt deposition in vineyards around harvest time, damage to the trellis system, vines fallen over, or, in extreme cases, vineyards completely destroyed. Some remediation and recovery approaches applied with Bola are relevant with damage experienced with Cyclone Gabrielle.

Below are typical vineyard issues associated with the storm damage along with suggested solutions gathered from growers who dealt with Cyclone Bola in 1988. They are not prescriptive but should be adapted to specific situations given that the extent of the damage may vary within a single vineyard block and across different vineyards within the same area. It should be noted that prior to Bola, the season was normal, this is in comparison to Gabrielle where we were already experiencing high rainfall, and therefore higher soil moisture levels prior to the cyclone. It is unknown what impact this will have on the vines.

GENERAL CONSIDERATIONS

- **Grapevines are very resilient compared to other perennial fruit crops such as apple trees or kiwifruit.**
- **Being a processed crop, grapes and grapevines are less impacted than fresh produce crops.**
- **Out of all crops, grapevines, together with persimmon trees and olive trees appear to have the highest tolerance to water logging.**
- **In Cyclone Bola, grapevines did not die due to the silt deposits within the vineyard, or by being knocked to the ground with the collapse of the trellis due to the force of the flood waters.**
- **For all actions that you take, you need to consider if the cost of the action is reasonable when you consider the value of the outcome.**

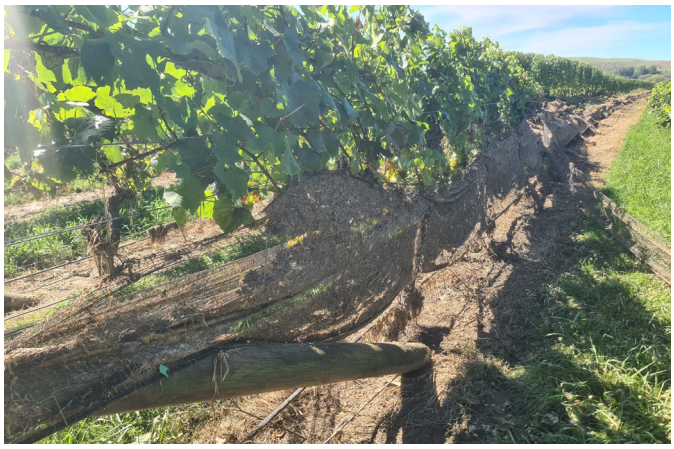
Below are some situations of concern and how they might be addressed.

Issue 1: Deposits on the berries.

- For all vineyards that have had flood water at the bunch zone, follow the NZW advice on risk assessment and treatment options for potential flood contamination. This can be found on the NZW flood response webpage.
- Consult with the receiving winery regarding any risks of contamination.

Issue 2: Debris in the vineyard.

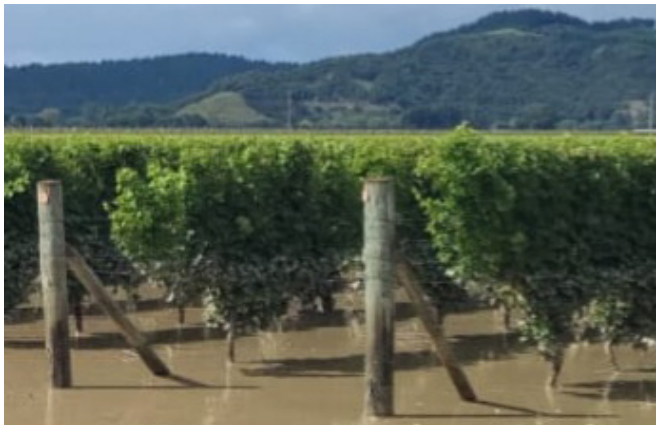
- If your vineyard has been netted, remove the nets from the vines if they contain debris in them.
- Before harvest walk the rows to make sure there are no objects in the canopy that may interfere with the harvesters and grape processing.



Nets after being in flood waters, remove netting

Issue 3: Vineyard covered with silt.

- Once floodwaters have receded vineyards are often left with a silt deposit.
- The silt that has been deposited is a natural process that has been happening on the Heretaunga plains and Gisborne for millions of years and is comprised of the same base material that makes up your soil on your vineyard. In Gisborne this silt will have a higher clay content to it.



Vineyard where silt has been in the bunch zone and now sitting in wet silt, credit Hamish Jackson

- As grapevines have a high tolerance for water logging, there is no immediate need to remove the silt from a vineyard for vine health.
- There is low risk that prolonged anaerobic soil conditions will cause any issues for the vines.
- Ensure PPE is worn when handling the silt, masks and gloves are recommended.
- The overwhelming advice is to wait for the silt to dry.
    - Any effort to work in wet silt or try to remove wet silt will result in high costs for little reward.
    - Where possible, assist with the drainage as this may help the silt dry faster.
- Although considered very unlikely, and only in exceptional circumstances, particularly if there is a protracted period for the silt to dry, the vines may show signs of stress.
    - The vine canopies are clear indicators of any vine stress. Visual assessment should be used to determine any stress.
    - A vine that is experiencing water logging or anerobic conditions, will show wilting, chlorosis, blackened veins, and marginal necrosis of leaves and leaves of reduced size on lateral shoots. Use these signs as an indicator to commence any remedial action – such as digging the silt away from the trunk, using a ripper or grader to increase oxygen delivery to the soil.

3.1 Final silt level is below the graft union.

- If the final silt level is below the graft union, you will not need to do anything prior to harvest.
    - Wait for the silt to dry.
    - Avoid disturbing the silt prior to machine harvesting.
- Fine silt will be blown off.
- Silt may crack increasing oxygenation to the soil below.
- After harvest you may consider working the silt up and incorporating it with your soil, sowing an inter row cover crop to help increase soil organic matter. Consider using deeper rooting cover crops to help work the silt into the soil.
- Get the silt tested to identify the soil properties and to ensure there are no contaminants in it.

3.2 Final silt level is above the graft union but below the bunch zone.

- Very similar to 3.1 Wait for the silt to dry.
- Harvester access and travel in the vineyard could be difficult:
    - Talk to your harvester driver to see if they are happy to machine harvest the vineyard
    - Tractors towing harvesters could be required.
    - Hand harvesting may have to be considered.
- Beware of dips and hollows in the vineyard, as these will be filled with more silt and may create a hazard. If possible, walk the rows once the silt is hard to identify any of these areas before any machinery travels down the rows.
- Ensure that headlands and gondola loading areas are safe – these areas may require some work to ensure safety at harvest time.
- If the silt is high and your vineyard is four canes, consider only harvesting the top two canes.
- Where silt is high, machine harvesting may struggle – especially around the head of the vine.
- For some vineyards, it will be a trade off between waiting for the silt to dry, increasing ripeness of the fruit, and increasing disease presence in the vineyard that will ultimately lead to the decision on whether harvest is viable.
- If you decide against harvesting your vineyard, you do not need to harvest the fruit to the ground – save costs. If you are worried about grapevine seedlings growing in the silt, these can be treated early the following season with effective post- emergent herbicide control.
- If the final silt level is above the graft union, you need to be aware that the vine will start producing roots from the scion into the soil. If these roots remain, the vine will be susceptible to phylloxera infestation in future years.
    - You need to decide about whether to remove the silt from the vine trunks to stop aerial rooting. This decision needs to consider the age and performance of the vines, along with the cost to remove the silt. This action does

not need to be undertaken until the silt is dry, and after harvest. It needs to be completed before the following spring when the largest root growth will occur.

3.3 If the silt was at the bunch level.

Silt through the bunches

- If the silt was in the bunch zone but has receded to below the bunch zone and left a silt deposit, you will need to talk to your winery about whether this is suitable to harvest still, and whether they have the capacity to treat the fruit.
- Refer to notes in Issue #1 for contamination risks.
- The best method for removal of silt from bunches is fine warm weather and wind.

3.4 Vines where final silt level is above the bunch zone.

- The cost of removing the silt to save the vines may outweigh the cost of completely redeveloping the vineyard or looking at a change in land use.
- If this occurs on part of your vineyard, you may want to consider shortening the rows and removing this area from your producing vineyard.
- Although buried seeds may germinate these can be killed the following season by applying a post-emergent herbicide.

Issue 4: Vines lying on the side but not dislodged.

- In some instances, the flood waters will have caused the vine row to fall over because the trellis structure has failed.
- Typically, the trunk will be flexible enough to bend, and the trunk would not have broken.
- As quickly as possible look to pick the vines up, replacing the posts in the process.
    - o You may need a large tractor or digger and strop, or a team of people to do this.
    - o This is a task that you can undertake early in your flood response.
- If silt or river gravel or other debris is on top of the vines, recovery of these vines maybe difficult.
- Ensure you highlight any areas that have been remediated like this to your harvester operator, so they are aware.

Issue 4: Vines lying on the side or fallen over, with no feasible way to correct.

- These vineyards will need to be gathered to allow for disposal of the vineyard infrastructure and vines.
- There is no hurry to perform this task.
- We are awaiting information on the best method for disposal given that wire, irrigation (nets) and posts maybe impossible to separate.
- Experience from Bola is that where possible removing the posts from the wire, is a good first step in the cleanup process.

Issue 5: Chemicals to apply to protect the vine and crop from disease because of flooding.

There is no need to apply any additional sprays to your vineyard from those that you would ordinarily be applying for bunch health at this time of the season. Extra spaying maybe impractical and yield little benefit, especially if harvest is within four weeks of the cyclone. At the current stage minimizing vineyard costs should be the strategy to adopt.

Issue 6: Vineyard located close to agrichemical storage

Run a risk assessment as outlined by the NZW guidelines for chemical risk assessment. Find them here.

Reach out to the community for help – there are experienced growers in the community who are able to provide assistance – contact emergencyresponse@nzwine.co.nz or Emma Taylor on 021 412 953 and she will be able to put you on contact with someone who has been in this situation before.

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