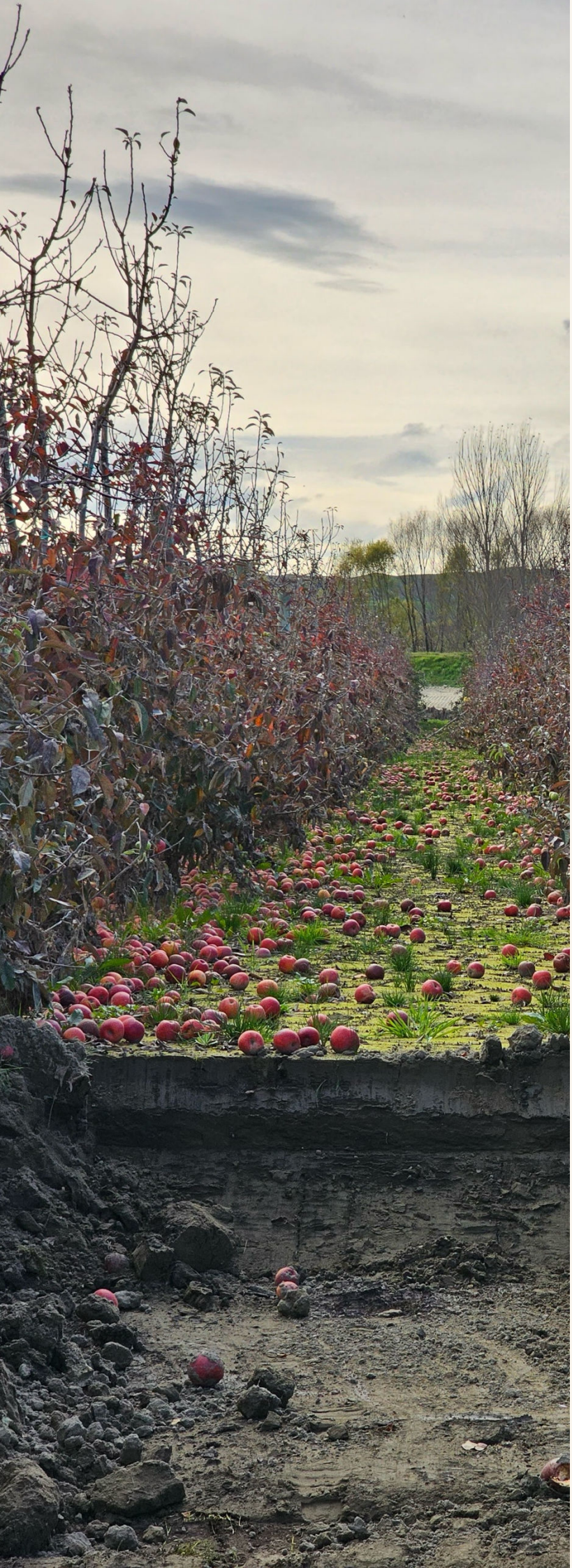

New Zealand Apples & Pears

Technical lessons from Cyclone Gabrielle response | 2023

Report prepared by

Plant & Food™ Research
Rangahau Ahumāra Kai

This report has been produced independently by The New Zealand Institute for Plant and Food Research Limited for New Zealand Apples & Pears Inc (November 2024).

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The authors of this report would like to thank everyone who generously gave their time to be interviewed for this review. Your honesty and willingness to recall sometimes difficult personal experiences, is enormously appreciated and will provide invaluable guidance for others facing similar situations in the future.

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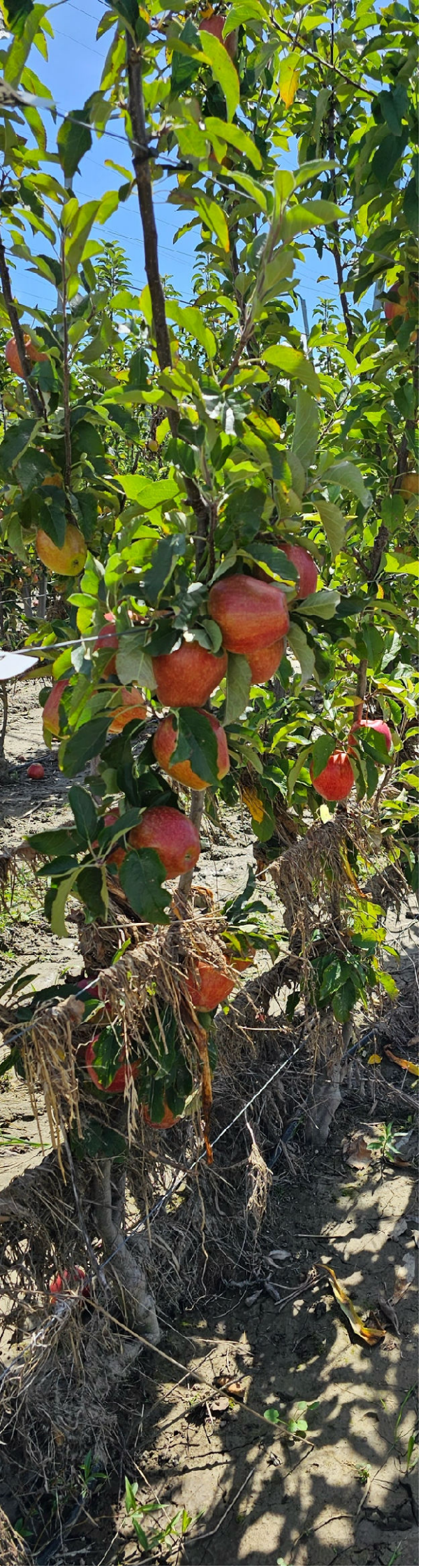


Contents

Cyclone Gabrielle – February 2023

Cyclone Gabrielle was a significant weather event that affected the East Coast of New Zealand, including the apple-producing areas of Gisborne and Hawke's Bay, in February 2023. Rainfall and surface flooding had a disastrous effect on the apple sector, with a range of impacts including total tree loss, silt deposits up to a metre deep, and severe packhouse flooding in the most severely affected areas. In Hawke's Bay around 2500 hectares of production land and 40% of the harvest was affected, and a further 30% (155 ha) in Tairāwhiti-Gisborne.

Immediately following the cyclone, New Zealand Apples and Pears Incorporated (NZAPI) staff began response and support activity, made exceptionally difficult in the short-term by loss of power and communications, inability to travel and personal impacts on staff. In the weeks following the cyclone, response activity became more coordinated, with NZAPI acting as a key collector and distributor of information for apple growers and the wider horticultural sector. Advice and recommendations were sought from consultants, retailers, the research community, councils and the New Zealand Ministry for Primary Industries (MPI), and collated and disseminated to growers in a range of formats to support orchard recovery. Technical topics included harvest support and food safety guidelines, silt management and removal, pest and disease control, and tree/crop management. Broader aspects included waste removal, mental health referral, and funding guidance. This support activity continued throughout 2023 and into 2024.

The extent of Cyclone Gabrielle's impact on growers and their orchard operations was compounded by timing, just after the start of 'Royal Gala' harvest, which challenged almost every aspect of the harvesting and export programme in 2023. To maximise learning opportunities from this event and be better prepared for future events, NZAPI has commissioned this review project. This review will broadly summarise and reference the material that was provided to growers, explore how advice was implemented and how useful it was, and provide a knowledge-bank and insights to inform the industry response to future challenges.

The Cyclone Gabrielle technical response review process

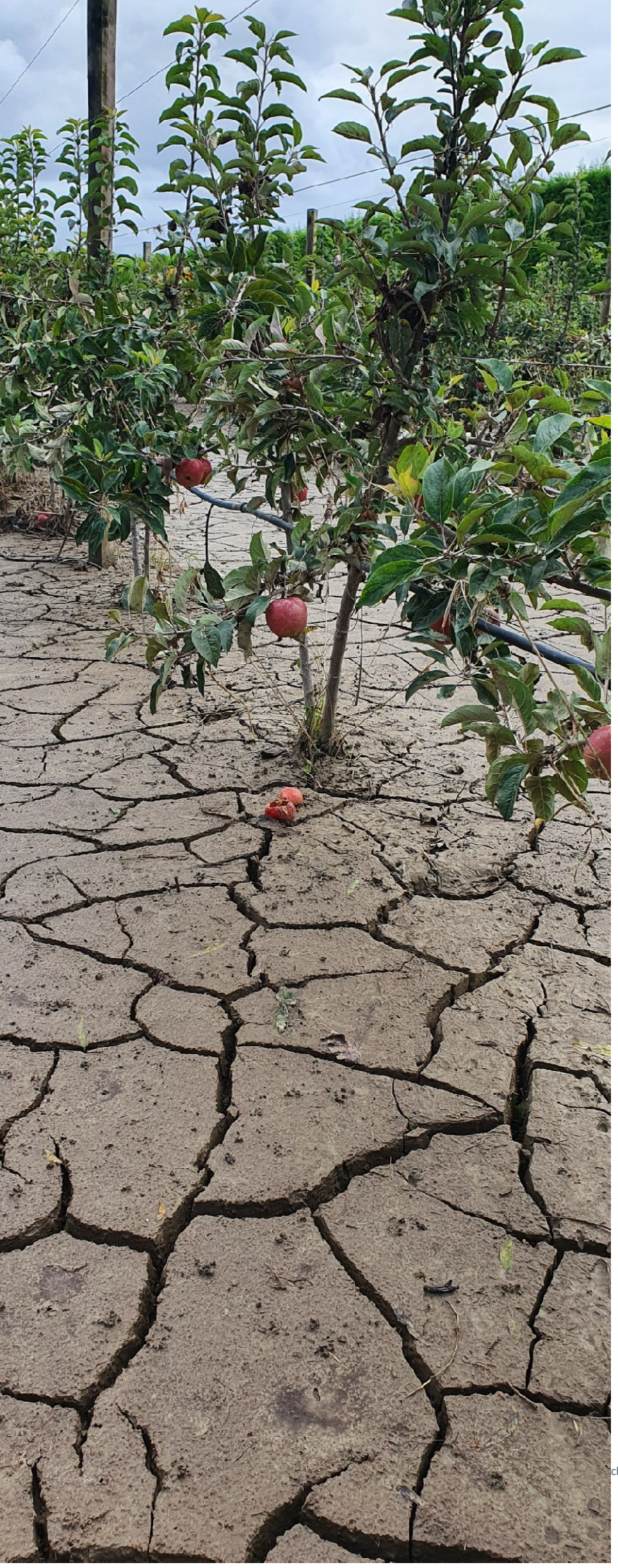
A qualitative approach was taken to review the usefulness of the NZAPI technical response following Cyclone Gabrielle. Focus groups and interviews were conducted amongst a targeted sample of affected industry stakeholders, as follows.

Stakeholder	Interview	Hawke's Bay		Tairāwhiti-Gisborne		TOTAL	
		Company (n=)	Individuals (n=)	Company (n=)	Individuals (n=)	Company (n=)	Individuals (n=)
Packhouses	February 2024	6	14	2	3	8	17
Technical experts	April 2024	7	7	1	1	8	8
Orchards	June 2024	10	12	5	5	15	17
Scientists (Plant & Food Research)	August 2024					1	5
TOTAL						**32**	**47**

The interviews were conducted by a locally based person contracted by NZAPI in Hawke's Bay and Tairāwhiti-Gisborne. The interviewers were well known in their local industry, and mostly to their interviewees. They had been in the affected regions during Cyclone Gabrielle themselves, which was essential to building a trusting rapport with interviewees following this event. Interviewers were supported by an independent researcher from Plant & Food Research with experience in qualitative approaches.

All interviews took place in the interviewees place of work. The primary interviewer was physically present, while the secondary interviewer (Plant & Food Research researcher) attended via virtual connection. All interviews were recorded by consent, under the understanding that the identities of all interviewees would remain anonymous.

Interviews followed a semi-structured guide and took 60–90 min each.



Section 1

COMMUNICATIONS LESSONS LEARNT

Technical information delivery in a crisis

Putting people first

In the midst of an emergency, it is difficult but critical to identify information priorities – what do people most need to know? In some instances, this is obvious, but there is great value in talking to people in the immediate aftermath to understand their specific technical needs. However, there is a fine line to tread, as many are in a state of overwhelm and shock, so sensitivity is essential in providing useful support, remembering technical solutions may not be the first priority for all.

In the immediate aftermath, people can be very isolated, physical access may be limited, and telecommunications are likely to be unavailable or unpredictable. During this time of considerable distress, working as a community is key, working together to locate and check-in on each other, to establish the safety and wellbeing of all. Emergency services will be in attendance but may not have access or capacity to reach everyone. At this time connecting with whānau and neighbours is likely to be the only thing people are concerned with.

Re-establishing communication after a crisis

The unpredictability of power and communication systems following Cyclone Gabrielle necessitated flexibility, relying on both in-person and digital channels for effective communication.

Initial Days (2–5 days): Many resumed work, depending on their personal level of impact. Power and telecoms were unreliable, making in-person contact the primary mode of communication.

After 1–2 Weeks: Power and telecoms stabilised in many areas, enabling phone calls, texts, emails, and social media for regular communication. Formal gatherings, both virtual and in-person, began to take place. For some people, power and telecom services were out for weeks, which contributed to a sense of isolation and despair.

In a post-crisis situation, there is likely to be an inundation of information from well-meaning sources of variable or uncertain credibility. To curtail the circulation of unreliable information and to provide appropriate and credible guidance across the industry, the following strategy for communication is recommended.

- Use a pre-prepared, multi-channel communication strategy to ensure clear guidance from trusted sources.
- Identify and/or generate credible, situation-specific recommendations.
- Ensure consistent messaging across all formats and trusted sources.
- Share information through multiple formats (e.g., digital and in-person) and channels to accommodate diverse learning preferences.
- Channels that enable information to be 'pushed' to your audience are key (they do not have time to seek information) e.g. phone calls, emails, texts.

Have a clear crisis communication strategy

The NZAPI communication strategy used following Cyclone Gabrielle was relatively successful in deploying important technical information across the affected industry in the days and weeks following the cyclone. However, this review exercise did reveal that the NZAPI response provided greater support to growers in Hawke's Bay than those growers in Tairāwhiti-Gisborne.

There were several possible reasons for this regional disparity in engagement. For the most part growers in Tairāwhiti-Gisborne grew multiple crops, and as such had less of a reliance on information specific to pipfruit than growers in Hawke's Bay. Further to this, the geographical distance of Tairāwhiti-Gisborne growers to the Hawke's Bay-based NZAPI team meant they had stronger relations with their packhouse and local consultants or peers for technical information. Following the cyclone, NZAPI representatives were unable to physically visit Tairāwhiti-Gisborne to provide response leadership, which also contributed to a reliance on other sources of technical guidance in his region. Packhouses in

Tairāwhiti-Gisborne were effective at disseminating NZAPI technical recommendations, although growers in this region were more engaged with local cyclone-response activities, which were focused on regional recovery rather than being specific to apple industry recovery.

Cyclone Gabrielle has provided a clear indication that NZAPI need to develop a crisis management plan that includes a regional coordinator, underpinned by a communication strategy that more effectively supports members at a distance.

Delivering technical content effectively in a crisis

NZAPI took on a response role to provide technical grower support in the aftermath of Cyclone Gabrielle. Valuable feedback was collected from growers and packhouses affected by the cyclone, which is presented here as guidance to the effective delivery of technical information following a crisis.

From Cyclone Gabrielle we learned that information must:

- **Start immediately**. Even if there is no immediate technical guidance, following a crisis people need to know that they can expect support from their industry body as soon as it is available.

> *"The worst thing you can do is not get anything out, people want to know what's going on, especially in times of panic. Having someone at least trying to guide them a little bit is really, really useful." (Hawke's Bay Technical Taskforce)*

- **Be trustworthy**. Most affected operators were very clear on who their sources of trusted information were. Forming alliances to generate and disseminate technical information collaboratively with these contacts will increase the chances of engagement and uptake.
    - Locally renowned experts/peers
    - Horticultural consultants, advisors, merchants and their reps
    - Operations with strong internal technical expertise (packhouses/exporters)
    - NZAPI, other industry bodies (if multi-crop), BioGro (organics)
    - Science-based organisations with appropriate subject matter experts
    - Government agencies; MPI, councils

> *"We would never trust one source of information. It's nice to know that everything aligns and if it doesn't, then I ask the question why?" (Tairāwhiti-Gisborne Grower)*

- **Be consistent**. Ensure agreement of technical recommendations between NZAPI and key industry influencers, so that all guidance in circulation, from no matter which trusted source (as above), is the same. This avoids confusion and uncertainty during a crisis.

- **Be shared using multiple formats**. Circulating technical recommendations through different people/organisations as well as via different physical and digital platforms will increase their potential to reach the people who need the information, particularly when modes of communication are unpredictable. Prioritise 'pushed' formats, as the audience is likely to have limited time and energy to seek information.

- **Be brief** and **easily understood.** Not vague and not overly technical. Bullet points worked well, with internet links for greater detail if required. People don't have time or mental headspace to contend with too much detail.

> *"I think that's important in a disaster. Because you are stressed. […], you're in the height of your emotions. […] So information coming out in small chunks, even if it was daily, […] was enough for you to process before the next lot came through." (Hawke's Bay Packhouse)*

- **Be practical**. Recommendations must consider the practical limitations that growers and packhouses are facing following

a disaster. ‘Best practice’ is not always achievable; what works in one region may not apply to another.

- **Be relevant.** Information priorities differ depending on the level of impact to an individual operation. Have information with relevance for everyone. Some growers commented that they felt that there was a lot of guidance relating to harvest, but limited guidance for those who completely lost orchards and needed recovery and cleanup advice. Water shortages were a critical issue in Tairāwhiti-Gisborne, limiting their fresh drinking water supply as well as water for refreshing packhouse water tanks, but this was not addressed in the technical updates. Information for organic operators was also sparse.

> *“If your information is coming from a more localised source, it's likely to be a little bit more relevant to what we're dealing with […] NZAPI responses a bit more national […] it's never going to be as in depth as on the ground or, you know, as your trusted partners here locally.” (Tairāwhiti-Gisborne Grower)*

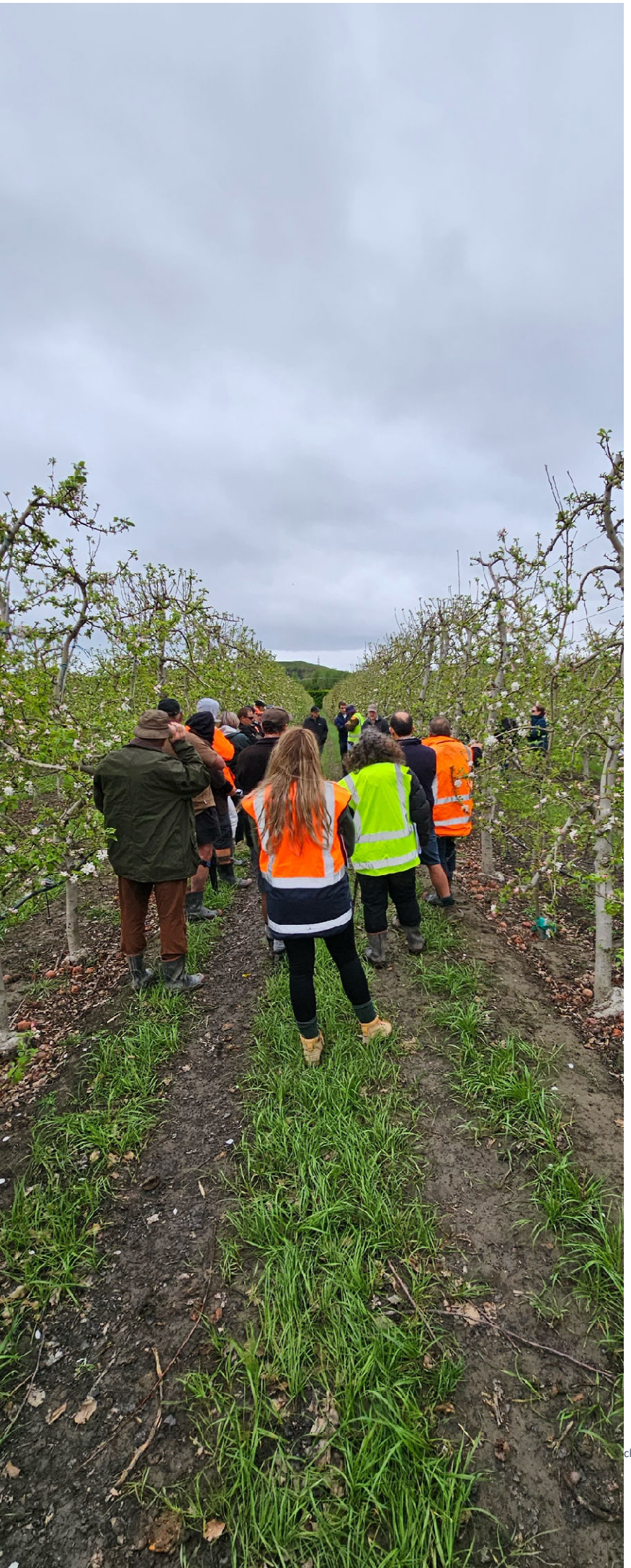
- **Present a local perspective**. Understanding unique regional needs is essential in providing useful technical advice. So is ensuring local or known experts are involved in information generation and/or dissemination, as readers are more likely to engage with information delivered from a trusted source.
- **Reiterate the basics.** In the chaos following a crisis, things get forgotten. Even if a technical update seems to state the obvious or be past the point of being needed, it could act as a valuable reminder, or validate a decision made, at a time when people are feeling uncertain and overwhelmed.
- **Be timely and audience appropriate.** Minimise communication overload overwhelming people, by releasing information only as it is required, and only to the most relevant audience.

Modes for sharing technical information

Feedback from affected growers showed a preference for 'pushed' formats of information, such as email, social media, text and calls, as time and energy to seek information was limited in the chaos following the crisis.

Information FORMAT	Benefits	Limitations	Other
Face-to-Face (F2F) Group sessions Field days, technical seminars, field walks, Grower meetings were welcomed in the immediate aftermath, offering support and connection. There was a sense of isolation in areas where they were not coordinated.	Early grower meetings were crucial for initial support and connection, information sharing, support, and expert advice, especially when power and internet were unavailable. Sessions in the early evening allowed for better attendance. For those unable to attend, video recordings were appreciated. Sessions helped address misinformation and promote best practices.	Active coordination was required to bring local experts and industry members together – could be limited by access issues. Smaller businesses struggled to attend, as they prioritized direct recovery over meetings. Ongoing field days became overwhelming for some, as recovery efforts took precedence.	Include financial and regulatory experts alongside technical advisors to support recovery. Continuing sessions beyond the immediate crisis helped maintain focus on long-term recovery goals.
F2F Individual visits from consultants, packhouse reps, etc. Feedback showed that these visits were appreciated, providing not just expert advice, but also a sense of solidarity and moral support.	Many appreciated in-person contact as a show of support to reduce feeling overwhelmed, and to seek guidance. Packhouse reps and consultants visited properties to observe conditions, estimate expected volumes, and understand unique information needs. Local field-force took information back to experts for further guidance.	Difficulty in mobilising people locally and accessing affected areas requiring assessment. For some, face-to-face engagement became too time-consuming, as recovery efforts took precedence. For those traumatised by the event, F2F contact was not always welcome.	*“It's hard to know, when to go and see somebody or when to leave them alone. […] if they are still processing. Yeah. It's actually more of a problem.” (Hawke’s Bay Grower)*

Information FORMAT	Benefits	Limitations	Other
Virtual meetings Collaborative forum for small, targeted groups, with focused agenda.	Enables experts to attend sessions, more perspectives contributed. Limiting attendance and agenda to specific people and topics ensured relevance, with no distractions from other functions.	Concerns about level of engagement during virtual meetings.	
Email Effective for detailed updates but requires accompanying notifications to alert when new content is available.	Email was the most-used channel for detailed technical updates, appreciated for its long-form content and links to additional information. Emails also acted as an archive for future reference. NZAPI updates served as a trusted, comprehensive source.	Power and internet outages made email inaccessible for some, lasting days or weeks. High email volume and recovery priorities made detailed emails less practical in the immediate aftermath.	Use short texts or calls to alert recipients about new email updates. Ensure alternative communication channels are available during outages.
Phone calls and texts Quick, direct, useful for notifications of other material.	Could only manage quick calls and texts owing to the urgency of recovery tasks. The direct nature of calls/texts, between familiar parties, proved supportive.	Ensuring up-to-date contact details is crucial; those missed out become isolated. Variable network coverage between telecom providers caused issues.	
Social media Cyclone Gabrielle Recovery WhatsApp group was well-liked.	A short-form, on-the-go communication tool, especially valuable for growers who had limited time to engage with other formats. Optional membership. Provided a platform for growers to share experiences, learn from each other, and create a support network. Facilitated the sharing of resources, in conjunction with the NZAPI Resource Finder. NZAPI, packhouses, etc. were able to monitor content to directly address issues, manage misinformation, and ensure appropriate practices were followed.	Frequent notifications became a distraction. Concerns arose over the content shared in the group, possible sources of misinformation, and image sharing that could reflect poorly on the industry. Limited focus on critical issues like food safety management.	*"That should be 101 for next time - straightaway. Because some of that lack of information […] is people experimenting, and you're saving each other lots of money by sharing your experience. It was hugely valuable and was hugely important at the time." (Hawke's Bay Grower)*
NZAPI website A central repository for technical information, but not practical to access during the chaos of immediate aftermath.	Provided a central repository of reliable, industry-endorsed technical information that could be accessed when needed.	Time-consuming and complex to locate information compared with pushed formats. For those with significant crop loss, limited relevant content. Growers relied on packhouse or consultants to relay relevant information, reducing their need to visit the website.	
Newspaper and TV CAUTION required.	Raises awareness and provides updates nationally and globally. Focused government attention on the need for support following the cyclone.	Newspaper coverage was widely viewed as untrustworthy. Industry members felt reports sensationalised issues and failed to correct inaccuracies, creating unnecessary alarm.	Media management plan required to: ensure consistent messaging, media enquiry contact person, proactively update media to counter sensationalism, and balance coverage.



Section 2

LEADERSHIP LESSONS

Leading effectively in a crisis

The Cyclone Gabrielle response

Growers, packhouses, technical experts and scientists that were affected and/or involved in the Cyclone Gabrielle response were interviewed to establish what lessons learnt could inform a future crisis management plan. During these conversations, NZAPI's response leadership and activities were reviewed.

The response initiative implemented by NZAPI following Cyclone Gabrielle was mostly effective for industry members based in Hawke's Bay, but had a more limited impact on those further north in Tairāwhiti-Gisborne. Future planning must take the following issues into account to develop a response plan that is coordinated and that addresses the local needs of members in any crisis-affected regions.

- No existing crisis management plan for the New Zealand apples and pears industry at the time of the event
- Very small NZAPI team, all Hawke's Bay-based, new to crisis leadership; team members who were also flood victims themselves; and no physical presence or leadership for NZAPI growers in other areas
- The industry structure and networks differed significantly between Hawke's Bay and Tairāwhiti-Gisborne, which hampered the efficacy of response activities in each region.

  Hawke's Bay experience: These are mostly single-crop (pipfruit) growers: large, well-networked industry, with locally based pipfruit technical experts and scientists. NZAPI are based here, so local growers have established relationships with the team. This proximity to the industry body meant local Hawke's Bay needs were understood, and local support networks were well established, so NZAPI were able to coordinate response activities relatively quickly. Consultants and merchants based here were very generous with their support, as they were also members of the affected community, as well as ultimately having a vested interest in the recovery of their client base in Hawke's Bay. All this had a positive impact on the response effort in this area.

Tairāwhiti-Gisborne experience: The industry in the region was less pipfruit-centric than in Hawke's Bay, with growers operating multi-crop businesses and local consultants having limited specific pipfruit expertise. Following the cyclone, Trust Tairāwhiti proactively led the regional impact assessment, focusing on financial recovery estimates for government support, but technical assistance was not part of their activity. Initial connections to NZAPI and other industry bodies were hindered by power outages, limited connectivity, and competing demands from other agencies. The smaller, less well-connected local industry, combined with physical distance from the industry body, resulted in lower engagement levels than in Hawke's Bay. This underscored the need to identify and coordinate local stakeholders as crisis management partners for future emergencies.

> *"If Hawke's Bay hadn't been hit I think it would have been a different scenario, I think that Gisborne would have just been left on its own." (Tairāwhiti-Gisborne Grower)*

Why NZAPI?

In February 2023, when Cyclone Gabrielle hit the main apple- and pear-growing regions of New Zealand, trees were laden with fruit; harvest of early varieties was already underway or imminent. Given this timing, the focus was on harvesting and exporting as much of the existing crop as possible.

NZAPI naturally fitted into the Cyclone Gabrielle response leadership role for several reasons.

- Their primary functions are advising on harvest and market access, and these were going to be the key challenges for the industry following the cyclone.
- They were in Hawke's Bay and had expertise and capability to respond, albeit limited staff numbers.
- They had strong industry networks among local packhouses, growers, consultants, merchants, etc.
- Plant & Food Research, their long-term science partner, were also locally based and ready to provide support.

Forming a technical leadership team

There was overwhelmingly positive feedback about how NZAPI led the technical response following Cyclone Gabrielle, from both Hawke's Bay and Tairāwhiti-Gisborne industry members. There was a great deal of compassion and appreciation for the efforts of the team, as they themselves had been victims of the disaster.

They were a small team, with reduced capacity because some staff had been affected by the cyclone. Their CEO had recently stepped down, but they took a strong and clear lead to support their industry. As soon as the cyclone hit the region, several existing NZAPI team members took responsibility for leading the response effort.

The Market Access Manager stepped into the Flood Response Manager role. From here, a network of roles was built from outside the organisation to wrap around this newly formed role, to expand the breadth of technical expertise available for the response.

Cyclone Gabrielle technical flood response network roles

Each of the key technical roles that existed during the Cyclone Gabrielle response are presented below, as a guide to what could be useful in a future crisis. An overview of their key functions is provided, along with the specific credentials required to ensure success contributing to technical leadership following a crisis. Additionally, a list of more operational requirements of support people is provided, as these are often criteria that prove a barrier for people to contribute.

In preparing a crisis management plan, it is suggested to firstly identify the technical knowledge/experience credentials required to guide response activities. This should take priority before identifying specific individuals to fill specific roles, as it cannot be assumed that individuals will be available in a crisis.

> *"… a plan that could work for disasters going forward. And then they all know where they fit in, and then they also know where their expertise fits in … and then deputies in charge, so if that person is out who is the second in charge. And then disseminate that information. What do you do if the power goes down, etc." (Hawke's Bay Packhouse)*

NZAPI Flood Response Manager

Leader of NZAPI response activity and central point of contact for all response partners and flood-affected industry members. Used own professional networks to secure specific technical support immediately following the state of emergency, particularly around food safety guidance for harvest.

Credentials required: well-established industry knowledge and networks, known and respected across the industry. Strong leadership and communication abilities, practical, and will partner strategically to fill knowledge gaps as required.

Science Liaison

A principal scientist was seconded from Plant & Food Research to NZAPI for five weeks to lead the science and technical response alongside the Flood Response Manager. This role was multi-faceted: participant on NZAPI Technical Taskforce, coordinator of, and contributor to, Plant & Food Research Flood Response Forum, liaison between NZAPI and Plant & Food Research science staff, and in 2024 they were contracted by NZAPI to co-lead the Cyclone Gabrielle technical response review project.

This role included a vital communication management function, to reduce the volume of enquiries to both affected growers, and the team at NZAPI, all of whom were inundated with response activities.

The secondment itself, as well as the function of controlling communications, was not communicated well within Plant & Food Research, which contributed frustration among some Plant & Food Research researchers who felt obstructed from supporting response activities.

In future, when role changes occur to support emergency activity, it is vital for efficiency and cooperation that roles and responsibilities are made clear to all involved. Ultimately having a Plant & Food Research staff member directly

involved in the response leadership provided greater transparency of the local situation and the needs of the industry, which scientists based outside the region would not have otherwise had. It also helped to focus the response activity and grower communications to immediate issues that affected the safe harvest of a significant proportion of the national apple crop.

Credentials required: well-known, respected scientist, leader in area of expertise, very well networked across the apple and pear industry and science sector. Oversight of existing knowledge.

Technical Taskforce

Apple and pear industry-specific technical leadership was provided in Hawke's Bay via NZAPI and the wider flood response network. While this information was disseminated to packhouses and growers in Tairāwhiti-Gisborne, the smaller, less connected industry and the absence of any locally based experts meant members had limited crop-specific support for their unique needs following the cyclone. Their greatest source of technical support in the region came from their packhouse and the pan-crop horticultural consultants.

There were ten core members of the NZAPI Hawke's Bay Technical Taskforce. They were all well known to NZAPI and selected for their well-established reputations in their area of expertise, and for being known and trusted across the local industry, and some even nationally, with access to wide professional networks. Other experts were also consulted by the taskforce as the need arose for additional knowledge.

> *"What impressed me was when you get the people around a table that are the frontline advisors to the industry, how much knowledge they had." (Hawke's Bay Technical Taskforce)*

The size of this group was intentionally limited to facilitate open, respectful discussion and rapid decision making. Meetings were frequent, weekly, initially and mostly virtual to make attendance more convenient.

The primary function of the group was to establish what information was required, agree the most appropriate technical guidance and then disseminate it clearly and consistently across their networks – 'one source of truth'. The aim was to avoid the circulation of misinformation or unvalidated recommendations. NZAPI shared the same messages through their flood response channels, which had the benefit of providing industry body endorsement to any recommendations.

> *"The group itself, there was a lot of familiarity amongst us as we've either worked together before or worked on projects before. So when something needs to happen, the togetherness and familiarity was helpful." (Hawke's Bay Technical Taskforce)*

Most of the taskforce members were in the field each day, or worked with teams who were, so they were hearing directly what technical information was required. The WhatsApp growers' group was also a means of monitoring what information (and misinformation) was circulating and where the gaps in technical knowledge were.

Key activity: NZAPI collaborated with a small team of on-the-ground technical experts (some were members of the Technical Taskforce). Collectively, this team had extensive firsthand experience from visiting much of the affected areas in Hawke's Bay. Leveraging their knowledge, they created impact zone maps for the region, which were digitised and integrated into NZAPI's Geographic Information System (GIS). This GIS combined registration data with multiple other data layers, creating a versatile tool that allowed NZAPI to respond to various information requests, such as estimates of the impacted area and volume loss.

> *"That group (Technical Taskforce) almost knew the extent of the damage by property. And they were able to draw these maps that then NZAPI was able to GIS and very quickly work out the impact of the loss. I thought that was very powerful." (Hawke's Bay Technical Taskforce)*

Independent consultants generously provided their expertise and time to supporting recovery efforts following Cyclone Gabrielle. Smaller consultancies reported struggling to cover their costs during the immediate aftermath, although these may have been recouped in the 18 months since the cyclone through cyclone-related consultancy. To prevent any potential financial inequity in the future, it is suggested that consultants who contributed time to the response effort provide estimates of the time they dedicated, so that provision can be made for this expense in the crisis management plan.

Credentials required: established technical knowledge and reputation in their field, specific crop expertise, respected and trusted among local/national industry members, broad industry networks, have a 'for the good of the industry' attitude, not involved for personal/professional gain.

Plant & Food Research Flood Response Forum

Researchers within Plant & Food Research have long-standing relationships with NZAPI, through prior Ministry of Business Employment and Innovation (MBIE) and MPI's Sustainable Food and Fibre Futures (SFFF) research programmes relating to food safety, summer rots, European canker etc. These connections contributed important knowledge that immediately benefitted the flood response.

This group was self-selecting (to a degree) within Plant & Food Research: most had existing partnerships with NZAPI so their unique expertise was well understood, and they could be contacted by the Flood Response Manager directly when necessary. It took approximately two weeks to establish a structure; activity was initially chaotic while needs were identified, staff availability secured, project plans formulated, and science funding identified.

Out-of-region visitor volumes were closely managed in the aftermath of the cyclone to relieve pressure on people and resources, so as not to hinder emergency response functions. Many Plant & Food Research scientists were based outside the affected regions, so relied on virtual meetings and feedback from the local field force to provide guidance and conduct research. This was relaxed somewhat eventually, so researchers were more able to visit to oversee investigations.

Entomology, food safety, plant pathology, and soil science were the keys areas of contribution from this forum, with support from tree physiologists and some within the crop physiology team.

Credentials required: established in their scientific discipline, understanding or ability to apply their specialist expertise to apple and pear crops in a practical manner, ability to work from a distance to the response effort.

Operational requirements support team members following a crisis

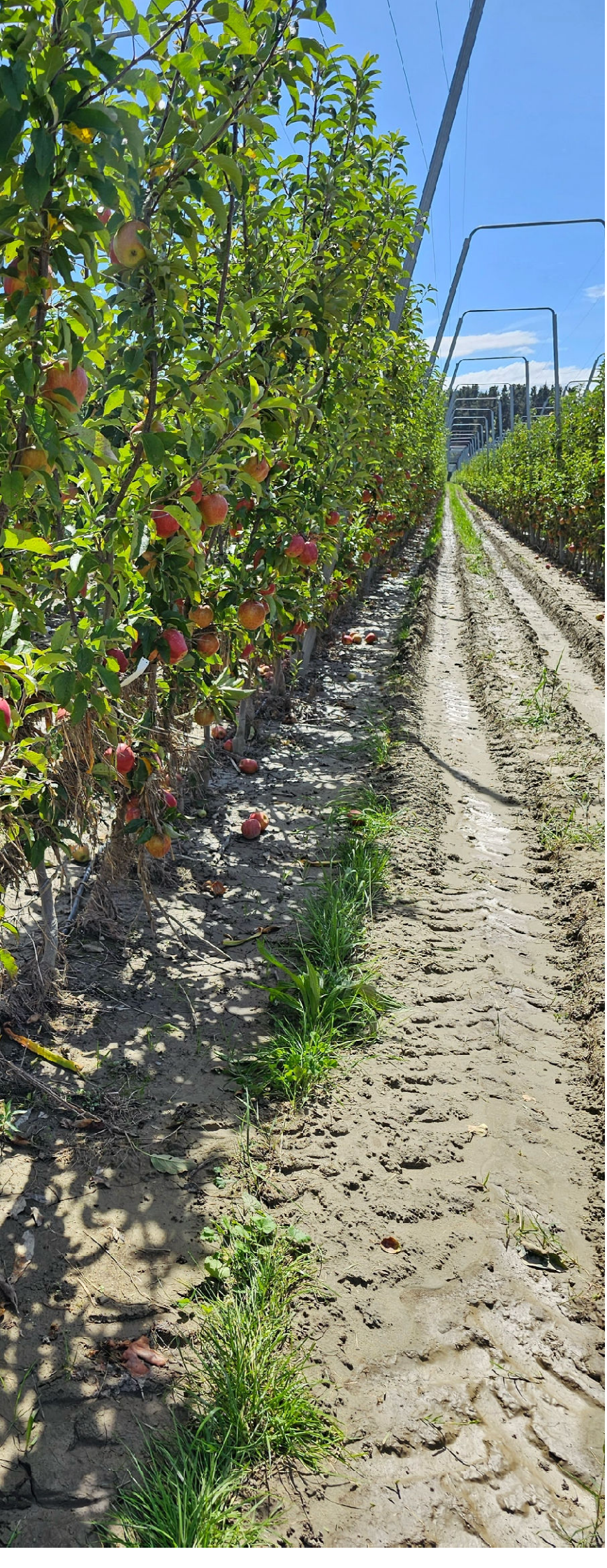
Over and above the specific technical expertise each of the support network members held, there were some basic operational requirements to ensure their capacity to support the response:

- Not significantly affected by the crisis themselves – need time and headspace to support others
- Locally based, able to understand the situation on-the-ground, and what the information needs are, or, have direct access to a field force who can capture and relay information to inform guidance. There are advantages to knowing the people involved; this can make it easier to engage more openly during highly stressful times
- Comfortable relaying technical recommendations on topics outside their own area of expertise, to ensure repeated and consistent technical messaging across industry. Repeating information raises the probability of it being heard by an overwhelmed/traumatised audience
- Ability to engage with sensitivity, as people are affected by trauma and become overwhelmed. Being local and knowing the people affected personally will help them feel more at ease discussing their situation and asking for support.

> *"Has to be [local] because the regions are a bit unique. If you're looking at support for kiwifruit in Tairāwhiti, Bay of Plenty expertise is limited, because they just aren't familiar with our soil types and our climate." (Tairāwhiti-Gisborne tech advisor)*

> *"So the message was exactly the same no matter who you talk to from PFR, Fruition, AgFirst, merchants and suppliers. We're all supporting and encouraging each other." (Hawke's Bay Technical Taskforce)*

> *"Everybody's been around the growers for decades, right. They're friends, they're colleagues, they, you know, you've got to be sensitive with this, but also tow a line of sensibility and risk." (Hawke's Bay Technical Taskforce)*



Section 3

TECHNICAL LESSONS LEARNT

What we now know

NZAPI circulated many technical recommendations in the days and weeks following Cyclone Gabrielle. All these guidelines have been collated and are included in the November 2024 NZAPI document, *Timeline of Cyclone Gabrielle Technical Recommendations,* available on request.

The technical recommendations discussed in this document are the ones that stakeholders spontaneously raised during their interviews. It was not possible to review every technical communication, so the topics presented are considered those that were top-of-mind and important for interviewees.

This summary presents recommendations that worked well for packhouses and growers following the cyclone, as well as those that required adapting to suit the situation as it evolved.

Impact and risk assessment

Evaluating the impact, and associated risks, of the cyclone and flooding to operations was a critical activity for businesses once the safety and wellness of people had been secured.

Site assessments

- Assessing the impact to packhouse/orchard is crucial as soon as reasonably possible. This information is critical to plan and prioritise next steps.
- Take photos and notes so information can be referred to and/or shared if need be (exporter, packhouses, NZAPI, insurance, etc.).
- Where possible, packhouses should visit their supply group to understand impact, estimate expected volumes, provide guidance on safe operating procedures and reminders of importance of food safety protocols. Provide support to plan response and recovery activities.

Fruit testing to establish risk mitigation plan

The risk of crop contamination, and the nature of any contamination, will always be unique to the specific situation and location of a crisis event. In the case of food production, it is essential that the risk to food safety is very quickly established, to facilitate appropriate mitigation processes. Until risks are understood, conservative measures to avoid contamination must be applied. In the case of Cyclone Gabrielle, growers were directed not to harvest any fruit that had potentially touched floodwater.

Following Cyclone Gabrielle, the failure of stop banks and extensive flooding meant there were many potential contaminants, including petroleum compounds, agrichemicals, heavy metals, sewerage and human pathogens. Fruit were sampled from across affected areas for testing to establish the presence and nature of potential contamination.

To be able to establish the risk of contamination quickly and effectively following a crisis:

- Have an emergency response plan that includes funding, sampling criteria and sample handling (logistics), to support an appropriate response plan.
- Establish fruit sampling plans for different crisis scenarios (industry-level).
- Establish plans for contamination testing for different crisis scenarios (industry-level).
- Benchmark figures of normal microbiological/chemical measurements, specific to the crop, must be known in advance to allow comparison with fruit affected by a crisis event.
- Identify operational issues that could limit food safety testing, to enable mitigation planning. Following Cyclone Gabrielle, lab testing took longer than anticipated, owing to: transport issues, high sample volumes, and the requirement for non-routine tests. It was seven weeks until formal test results were available to NZAPI. In the interim, NZAPI set up a lab to carry out environmental swab testing for ATP and *E. coli*, as preliminary screening to identify where additional testing was required by external labs.
- Consider relevance to organic crops in any plans, based on consultation with BioGro New Zealand.

Food safety

Any disaster situation that affects a food production system is likely to result in unique food safety uncertainties that need to be identified and quantified, to make appropriate decisions. Having an already well-established food safety culture across orchards and packhouses is the best insurance against a food safety incident, which could be catastrophic to the New Zealand industry.

Following a crisis where food is potentially contaminated, a thorough risk assessment must be conducted with urgency, to inform the best course of action to ensure food safety. In the case of Cyclone Gabrielle, growers were directed not to harvest any fruit that had potentially touched floodwater, until the presence and nature of possible contamination was established, and appropriate measures could be communicated.

The importance of a strong food safety culture at all times

Fresh produce is a high-risk food product, as it is exposed to many potential sources of contamination throughout its production, and it is often eaten raw. For these reasons, food safety understanding and systems are essential to operating a business involved in the production of fresh fruit.

- Establish a strong food safety culture across the business. This will provide essential knowledge and tools for day-to-day operations, that can also be applied in a crisis. Staff training, documented food safety protocols and methods for environmental/product monitoring are all key mechanisms that should be in place in every packhouse and/or orchard. There is food safety training material in the members' section of the NZAPI website.
- Existing food safety protocols can be referred to and adjusted as appropriate to the specifics of the situation.
- Carry out a risk assessment of produce affected by the event to decide which produce are safe to harvest. This may require sampling and testing for microbiological and chemical contaminants.
- There will never be a situation where fruit that have directly contacted a possible source of contamination, such as flood water, will be harvested for consumption.
- Segregate unaffected fruit from affected fruit, whether from parts of an orchard or parts of a tree, until fruit testing makes clear the best risk mitigation actions.
- Packhouses and large growing operations typically have dedicated food safety/quality/technical roles within their business, to ensure compliance to food safety standards. NZAPI supports their ongoing proficiency via material resulting from a Food Safety-focused Sustainable Food & Fibre Fund project. These experts can provide guidance to operators with limited internal expertise within their supply group.
- Any personnel involved in sampling and testing for food safety must be appropriately trained; most packhouse staff are highly proficient. In the response to Cyclone Gabrielle, inconsistencies in the biosafety requirements of different organisations excluded some, although wholly qualified, from offering support to ease the backlog of testing.

Harvesting guidelines

The following harvesting recommendations were made following Cyclone Gabrielle, and they were validated through fruit testing as appropriate for this situation. However, this specific guidance may not apply for future floods. There is limited published information on flood-related splashing.

Cyclone Gabrielle recommendations:

Do not pick any fruit that were submerged or less than 30 cm above the flood line—within the splash zone.

  - Fruit can be dropped by intervention or will drop on their own within about two weeks because of *Phytophthora*-related fruit rots.

- Fruit higher than 30c m above the flood line (above splash zone) can be harvested but must be segregated from non-flood affected fruit and treated as high risk in the packhouse.

"The best thing we can do for growers is harvest as much fruit as possible. But without taking any risks. Because all customers are going to have eyes on this, they're going to be doing more checks than they usually would." (Hawke's Bay Packhouse)

- Plan and demonstrate a strategy to guide pickers to pick only above the splash zone (exporters may request evidence of this).
  - A few practical suggestions to guide pickers: mark posts/trees with paint/string/wire 30 cm above flood line to provide a visual guide.
  - Plan a strategy, so pickers know what to do if there is undulating terrain or no visible flood line.
  - Management of mud/silt on hands, picking bags, ladders etc. Ensure that pickers have facilities to wash hands, ready access to hand sanitisers, equipment to clean picking bags, ladders etc.
  - Where possible, have staff monitoring that picking restrictions are being complied with.
  - If exporter/packhouse are not confident in pick zone compliance, they may refuse to accept fruit.
- Segregate fruit from flood affected blocks—keep separate from non-flood affected fruit, ensure easily identifiable, treat as high risk; packhouses will apply additional postharvest risk mitigation measures.

Bin management

- Do not use bins that have been in contact with floodwater and soil/silt. Separate from clean bins.
- If no clean bins available, wash and sanitise bins before use (self or outsource), line with a new knapsack, locate new bins. Following Cyclone Gabrielle, a local company voluntarily collected and cleaned/sanitised flood-affected bins for return to growers who needed them for harvest. NZAPI provided guidance on appropriate decontamination protocols.
- Do not place bins on the silted ground, especially if wet. Place on pallets, platforms, etc.
- Do not stack bins if there is mud on the skids.
- If mud splatters onto the outside of bins containing fruit, allow to dry and knock/dry brush off. If washing off, be cautious—do not let dirty wash water contact fruit in the bin.

Operational precautions on orchard and packhouse

- Silt and floodwater are extremely easily splattered and spread. Slow vehicle speed and attach mudflaps to avoid contamination of bins, fruit, trees. Put an extra driver on to maintain efficiency when driving more slowly.
- Tree deaths had a higher prevalence in high traffic areas around the orchard, where the ground was becoming highly compacted, and mud/silt was splashing onto nearby trees. Allocating a buffer zone of sacrificial trees can allow more free and efficient movement.
- Promote hygiene practices (regular hand washing, use of sanitisers, cleaning of picking bags) for all fruit handlers to avoid introduction of contamination of bins/fruit from people/surroundings.
- Ensure staff understanding of the potential health risks associated with contamination and injury from known and unknown sources. Ensure Personal Protective Equipment (PPE) is available. Consider the strenuous nature of recovery work and the need for rest and sustenance. In water shortage situations, it is essential to make accommodations for fresh water for drinking and washing, as well as toilet facilities.

Packhouse environmental monitoring and cleaning

Following a severe flooding and weather event, it is most likely that existing packhouse protocols for environmental monitoring and cleaning will require review, to ensure appropriateness for the contamination risk of the specific situation.

- ATP monitoring as standard, plus additional pathogen monitoring as appropriate (e.g. *E. coli*, faecal coliforms, *Listeria*)
- Increase frequency of swabbing on key/high risk surfaces
- Increase frequency of cleaning
- Improve cleaning methods, use of different/more concentrated/additional cleaning products, more rigorous scrubbing
    - in-house testing can be used to monitor efficacy of changes to cleaning regime

Packhouse: processing flood-affected fruit

Fruit arriving from flood-affected blocks must be segregated from non-flood affected fruit and treated as high risk. Research conducted during Cyclone Gabrielle showed more rigorous cleaning regimes, increased sanitiser rates and dwell times, and high-pressure washers are highly effective in inactivating and removing pathogens from affected fruit. If any uncertainty exists around whether fruit has been flood-affected or not, all fruit should be treated as high risk and the following recommendations applied.

- Minimise silt/mud entering the packhouse. Dry and knock off/dry brush or cautious washing to remove excess.
- Increase sanitiser rates and dwell times in the washer tank.
    - Dosing and dwell times, see tables on members' section of the NZAPI website.
- CAUTION required with increased concentrations of peracetic acid (PAA) dosing: ensure adequate ventilation for staff and monitor for increased wear on machinery parts.
- Increase frequency of water changes. In situations of water shortage, increase sanitiser dosing to maintain efficacy for longer before changing water, or use local bores (ensure water testing confirms no contamination).
- Use high-pressure washer system.
- Avoid dried silt and dust in the cool store: fans will spread dust/contamination.

> *"HarvestCide® - we can run at 20 parts per million, it doesn't hurt the apples. Might cost us a little more, but the contamination that it's killing is key, it's worth it." (Hawke's Bay Packhouse)*

Post-packhouse processing fruit testing

All fruit assigned as high-risk following a crisis will pass through increased food safety risk mitigation measures in the packhouse.

Fruit sampling and testing can be conducted to provide validation of the efficacy of these additional cleaning measures. This can be useful to provide reassurance of food safety to exporters, customers and consumers.

- If conducting post-processing fruit testing, monitoring for *E. coli* and *Listeria* spp., as a minimum, is suggested to provide assurance that cleaning regimes are sufficient.

> *"No water – that prevented us from operating. There are commercial bores around the district that extract from aquifer. […] finding out where they were. They're owned by the GDC." (Tairāwhiti-Gisborne Packhouse)*

- Ensure continued vigilance to avoid the introduction of flood-related contamination during packing. Detailed environmental monitoring guidance is provided in the food safety training material in the members' section of the NZAPI website, available on request.

Market access and phytosanitary information

Cyclone Gabrielle hit as early harvesting was underway, meaning the focus was very much on recovering and exporting as much of the harvest as possible. The export of fresh produce is a complex process at the best of times, so following this disaster, additional measures were essential to assuring importing markets that fruit from the flood-affected regions were safe for consumption, and longevity would not be adversely affected.

There was uncertainty about how export markets were reacting immediately following the cyclone, which led to a great deal of anxiety for growers. Once appropriate measures had been established between NZAPI and MPI, this allowed growers the confidence to plan their next steps.

Market access lessons learnt from the Cyclone Gabrielle experience:

- The safety of people is more important that accessing and/or saving traps following an emergency.
- In the case of lost or destroyed codling moth traps, and spray diaries, work closely with NZAPI regarding specifics. They will engage with MPI to establish exceptions from the codling moth-sensitive market (CMSM) OAP (Official Assurance Programme).
    - Following Cyclone Gabrielle, decisions and communications from MPI were slow, which caused anxiety across the industry.

> *"some of the traps were gone, washed away, but they were still present in those blocks where we were able to harvest the top half of the trees. We didn't lose our spray diary information." (Hawke's Bay Grower)*

- Merchants were also allies in assessing traps where possible.
- Some third parties, not previously known to the apple industry, tried to secure export licenses for flood-affected fruit, which could have jeopardised New Zealand's reputation in Official Assurance Programmes. These attempts to export were unsuccessful but highlighted a need to consider measures that provide greater protection against unscrupulous behaviours in the future, to protect the reputation of New Zealand's export produce.
- Exporters were the key source of updates regarding market sentiment/concerns; for those without direct connections, there was a void in understanding market responses. This was a barrier to quick decision making, as there was uncertainty about which markets would accept fruit, and what they would pay following the cyclone.
    - Based on such feedback and/or concerns from exporters, could NZAPI facilitate a broader communication role in the future?
    - Wider understanding enables faster trade-off decisions around harvesting versus orchard recovery (spraying) strategies and establishing the most appropriate target markets (which may involve sale-price sacrifice for the current season).
- Expect to demonstrate and provide written assurance of food safety processes to packhouses, exporters and/or NZAPI; this is essential to providing confidence to customers and importers.
    - Lack of adherence, or false declarations, not only pose a health risk to consumers but a huge reputational risk to the New Zealand industry.

Orchard and tree recovery

The New Zealand horticultural sector was not prepared for managing a significant flooding event. Lessons learnt from previous events in New Zealand had not been well documented, so guidance was limited and mostly anecdotal.

Resilience of apple trees

Various statements made immediately following Cyclone Gabrielle suggested that apple trees could die if exposed to waterlogging for as few as three days and up to 14 days. It transpired that these estimates were unduly pessimistic. Extended waterlogging that followed the cyclone found that apple trees on the Heretaunga Plains were more resilient to waterlogging and silt deposition than expected. Monitored transects showed high survival rates of mature trees where the sediment was removed, a few weeks to 2–3 months after the cyclone. Some studies in the scientific literature suggest for mature apples trees it took at least six weeks of waterlogging before photosynthetic rates began to slow, and other indicators showed plants were beginning to weaken. This was not the case for younger trees, and trees on dwarfing rootstocks ('M9'), where losses were generally higher.

Other factors that increased losses were a higher water table (within 45 cm of the surface), deeper sediment, heavier textured soils and type of rootstock, with less vigorous rootstocks generally being more susceptible.

Further to this, there was some evidence that some varietal/rootstock combinations could withstand longer periods of flooding and potential oxygen deprivation than others (e.g. 'MM106' were more resilient than 'M9'; 'Scilate' on 'M9' was more resilient than 'SciFresh' on 'M9').

Apple trees appeared more tolerant to low oxygen than kiwifruit and stonefruit.

Waterlogging

Water pooling around trees stops air reaching the roots, asphyxiating the plant. Removing surface water is a priority following periods of heavy rain and/or flooding. Extended waterlogging was a leading cause of tree deaths, both in the short and the long term, particularly in younger trees.

- Sandy soils beneath flooded areas will drain more readily than clay soils; however, if the water table is high, trees will remain waterlogged.
- Use pumps, dig channels to redirect/drain water (ensuring water has somewhere to go), and clear blocked tile drains/drains.
- Depending on the source of flooding, it may be the council who need to clear waterways.
- Older trees were more resilient to both waterlogging and silt encasement than younger trees; this must be considered when prioritising orchard recovery operations.
- Those growers who had excellent drainage systems in place during Cyclone Gabrielle were well-placed to make prompt decisions, while ongoing surface-flooding delayed and complicated this decision for others. Consequently, making decisions on the removal of silt depends very much on the soil type and the persistence of surface flooding in each block.

Silt removal

Similarly to the effect of waterlogging, silt forms an impenetrable seal that stops air (and water) reaching the roots, causing the plant to asphyxiate, as well as providing an environment for aerial rooting of scions and/or the development of collar rots.

Silt removal is an extremely resource-heavy activity: it is very costly and is heavily dependent on coordination among local operators and councils regarding appropriate disposal. Following Cyclone Gabrielle, many of those interviewed talked about their frustration with slow decision-making within their local councils regarding silt management. This was a significant cause of stress, which delayed their ability to make and execute timely and informed decisions.

There is no single solution. The decision to remove silt or not, is very complex; it is highly situation- and crop-dependent and must be well considered before committing valuable resources. A few of the variables that can

influence silt management decisions include (but are not limited to), soil structure and physical properties, drainage, any prior site drainage issues, depth of silt, rootstock, variety (economics), and tree age.

The Cyclone Gabrielle experience has provided some generally applicable lessons that can be considered in planning response activities following flooding, although for the most part, effective silt management decisions will require expert analysis and guidance.

A positive lesson arising from the Cyclone Gabrielle experience was that apple trees were shown to be more resilient to the effects of flooding than expected, and were decidedly more resilient than kiwifruit and summer fruit.

Prioritisation

- No immediate urgency (3–14 days) to remove silt.
- Prioritise blocks by digging holes to assess the degree of waterlogging underneath the silt layer. Refer to Silt Decision tree—available on request.
- If the silt can dry out, cracks can form allowing air to penetrate, and weeds to grow, increasing porosity.
- Do not attempt to move saturated (liquid) silt; allow to dry out somewhat first.
- Apple trees typically survived six weeks waterlogging (in Hawke's Bay with full crop load).
- Any areas with previously poor drainage will be most susceptible; get water flowing if possible.
- Young trees are more susceptible; clear silt from around each tree to allow air to penetrate.
- 'M9' rootstocks are more susceptible.
- 'SciFresh' is very susceptible, 'Scilate' is more tolerant.

> *"We'd leave it (silt) there in the future, depending on varieties etc. We stopped worrying about it when we saw the big cracking, we knew that the air was getting down. (Hawke's Bay Grower)*

Remediation

- Block infrastructure, posts, wires, irrigation.
- Presence of reflective cloth hinders the ability to remove silt and creates more waterlogging, reducing the ability for the soil to dry out.

> *"still a lot of silt, so broke it up (for incorporation) ... probably the best thing we ever did. [....] In any future cyclone we would walk away from even more silted blocks (Hawke's Bay Grower)*

Economics

- Depth of silt
- Cost of removal
- Value of cultivar
- Age of block
- Revenue vs costs

An operational observation from Cyclone Gabrielle is that access to heavy machinery for silt removal and other resources will be limited and in high demand, so early decision-making enables greater access to available resources.

There was very limited pre-existing knowledge to inform silt management decisions. It became apparent that outcomes were dependent on a complex matrix of unique factors, much of which was learned by trial and error. A detailed survey was conducted amongst affected Hawke's Bay growers shortly after the cyclone (March 2023) to understand the impacts of the sediment deposits and duration of waterlogging. The findings provide a comprehensive review of the merits and limitations of actions taken and outlines valuable lessons learnt for the future specific to managing silt following a flood. This report can be requested from NZAPI.

Nutrition

- Understanding the nutrient profile of the soil following a crisis is important to ensure the ongoing health and prosperity of the orchard.

Increase nutrition for trees compared with that provided in a normal season, as the stress induced on plants will lower their reserves and they will require increased nutrients to ensure survival.

Impact on storage

Scientists established that fruit from flood-affected orchards, so long as they were harvested from above the splash zone, were not likely to have an increased risk of rots developing during transport to export markets.

- Submerged fruit will rot within several weeks and/or drop as stems rot. Do not process and pack.
- Fruit from within the 30-cm buffer zone above the flood line will present with increased rates of rots. Do not process and pack.
- Fruit harvested from above the splash zone (from 30 cm above the flood line) are not expected to present increased rates of rots. These can be packed and transported, assuming compliance with all other quality control measures. N.B. This 30-cm splash zone may not be suited to other situations in the future.

Pests and diseases

Pest and disease management following a flood is like that required during wet seasons, although operational limitations will provide challenges. There will be a lack of access for some, and tractors and sprayers could be in short supply, so helicopter spraying may need to be considered, although availability and cost could be restrictive.

Cyclone Gabrielle provided a few additional cautions for the future.

- Always remain vigilant for signs of canker and *Phytophthora*.
- Some reported an increase in the prevalence of canker.
    - Any branch or picking wound submerged in flood water is likely to succumb to canker.
    - A few growers reported more canker in the variety TCL3.
- *Phytophthora* infection was inconsistent in flood-affected orchards, although its prevalence in apple crops strongly merits the use of "phos acid" (phosphorous acid, phosphonic acid, phosphite). This manages it well, although access to export markets needs to be considered.
- Despite low disease prevalence before the cyclone, black spot developed in storage for some (Chinese market access risk).

> *"I don't think that we lost any trees to* Phytophthora*, but canker has gone crazy this year, which is probably the combination of the cyclone and three years of wet harvests." (Hawke's Bay Grower)*

> *"We were absolutely surprised by black spot; we do a lot of monitoring, and we were relatively clean, but it blew out on us in storage" (Hawke's Bay Grower)*

Phytophthora and phosphorous acid application

Phytophthora is an issue every season, particularly following extended wet weather and/or flooding. The application of phos acid (phosphorous acid, phosphonic acid, phosphite) is an important consideration for all growers. Should a crisis occur around harvest time, impact assessments will inform orchard decisions as to whether the current crop can be harvested for export or not.

- Phos acid cannot be applied to fruit prior to harvest, as access to some export markets will be compromised by chemical residues.
- In cases where harvest is not possible, or financially viable, the application of phos acid is recommended to protect from phytophthora disease development across the orchard. Applications should wait until after harvest.

> *"Gabrielle exposed orchards and pockets within orchards where there were previously drainage and* Phytophthora *problems, and many more tree losses occurred in these areas." (Scientist)*

- If tree deaths appear imminent, there is no value in spraying.
- Heavier applications of phos acid are not necessarily more effective and may cause phytotoxicity. Two applications timed 2–4 weeks apart will provide adequate control.
- Phos acid should be applied when trees are in leaf. The optimal timing is between harvest and leaf fall, as this minimises residues in the fruit. However, spring and summer applications will leave a residue and as export market minimum residue levels (MRLs) vary, this needs to be considered. Some markets have nil tolerance. It must also be noted that phos acid residues can be carried from one season to the next. Knapsack spraying of selected trees, soil applications, etc. are alternatives to be considered if exporting.

> *"I do believe the phos acid definitely saved the trees and helped me get through." (Hawke's Bay Grower*

Section 4

SUMMARY OF CYCLONE GABRIELLE TECHNICAL RESPONSES

What did NZAPI do well?

This document has presented many detailed cases of successful technical support initiatives following Cyclone Gabrielle. The following are more overarching reflections of what the industry felt worked well from the NZAPI flood response.

- Holistic support: NZAPI were lauded for providing support over and above the technical updates. They made their offices available for those without operational resources; they hosted an MPI representative; they were quick to always respond to enquiries (seemingly available at all times); as well as being central to the initial response to check on the safety and wellbeing of industry members.

> *"they were out visiting growers […] And those things really go a long way. You know, nothing any of us could do we were just standing around looking at it all, but I think I think it meant a lot to them ... their presence and the support." (Hawke's Bay Packhouse)*

- Communications started quickly: immediately following the cyclone, growers just wanted to know that help was coming, that they were not entirely on their own. Even if NZAPI didn't have all the information ready to share, growers valued knowing that the information was coming.

> *"NZAPI did a bloody good job. They brought out wet weather gear, gumboots, safety glasses etc., that was great. Did a great job in responding to getting the crop off." (Hawke's Bay Grower)*

- Credible, trusted source of information: The information NZAPI shared was credible, trusted and generated by the right experts and sources.
- Partnering with known consultants and experts: formation of the technical taskforce and engagement with other scientists and experts helped to gain the information needed to support the industry.
- Key activities/documents: impact assessment mapping in both Hawke's Bay and Tairāwhiti-Gisborne, harvesting guidelines (30 cm above splash zone clarification), recirculation of table of sanitiser rates and dwell times. While these particular resources were noted as highly valued, all the technical recommendations were appreciated as reminders, guidance on what to do, or even just validation of decisions already made.
- Hawke's Bay support: large local industry with strong networks. NZAPI proximity to the affected areas enabled them to be more effective with supporting the response.
- MPI liaison: They did well as the liaison with MPI regarding phytosanitary dispensations and hosted an MPI representative in their offices in Hawke's Bay.

What could have been done differently?

For the most part, feedback regarding the usefulness of the NZAPI flood response was extremely positive, although once the chaos had settled and there had been time for reflection, there was more clarity around what could have been done differently. The finer details of tweaks to practical technical guidance have been included earlier in this document; the issues discussed here are more high-level points to inform future planning.

- Have a crisis management plan: Develop a pre-emptive crisis management plan suited to different types of disaster scenarios.

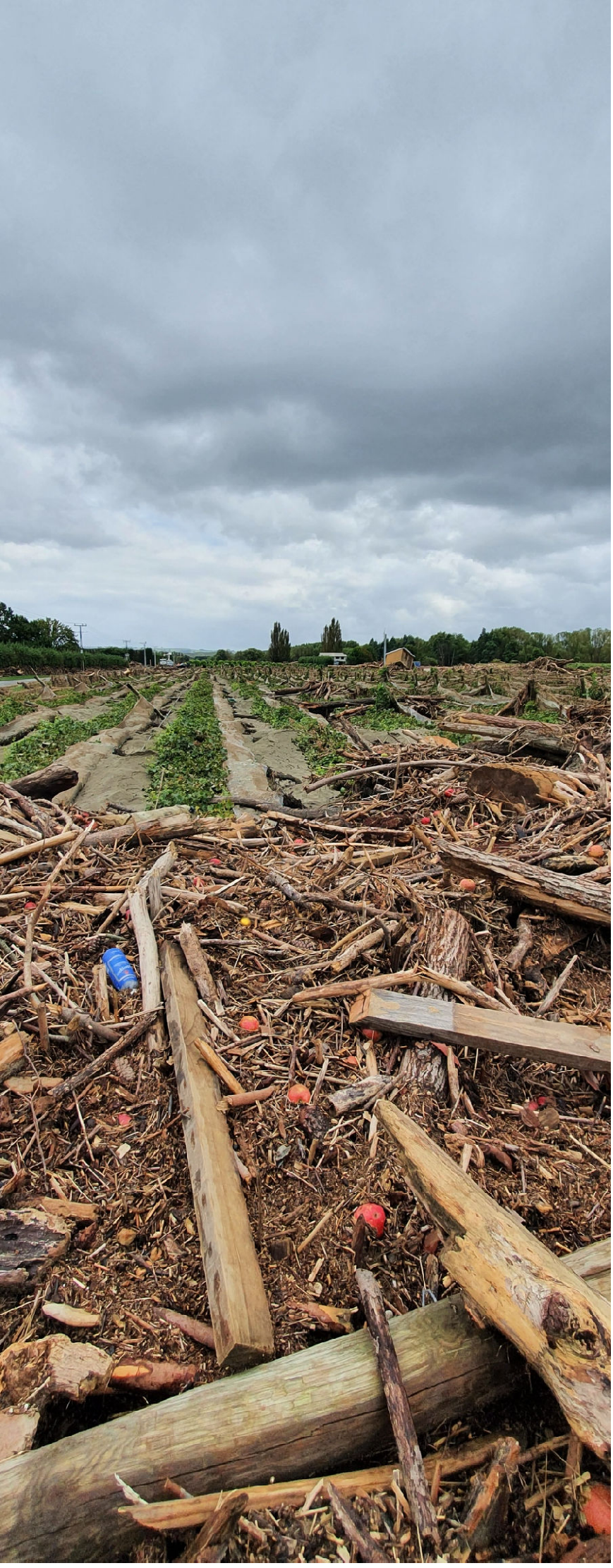
> *"imagine if that [technical information] had come out on 14th [February 2023] would have been a hell of a lot less stress for us all, because we were all trying to find out as we went." (Hawke's Bay Packhouse)*

- An earlier understanding of how the markets were responding to the news of Cyclone Gabrielle. This knowledge would have helped growers make quicker and more informed decisions. While beyond the control of NZAPI, growers were also hindered from making financial decisions until the Government had announced what support was going to be available.

- Ways of better supporting outside Hawke's Bay. Tairāwhiti-Gisborne had limited crop-specific technical support relevant to the needs in this region. Lack of direct interaction with NZAPI or industry experts, reliance on packhouses.
- Better advocacy to maintain standards: Stronger influence to apply best practice for the good of the entire industry following an emergency. There was little obligation to do the right thing, and as people's livelihoods were at stake, decisions could become emotionally driven.
- Support for absent landowners: Less-obvious stakeholders following the cyclone are the landlord property owners. These people may be older retired people for whom the property is an investment; in which case they may not have cropping expertise themselves. Following the cyclone, if their lessee walked off the land, the responsibility to rectify the property fell to these absent, and perhaps ill-equipped, owners. Left unattended, deserted orchards can negatively affect neighbouring properties, so providing support to ensure landlords are aware, and equipped to address their liabilities.

> *"Who's checking at an industry level that these things are happening? I don't want to use the word 'enforcement, but it's like there was no compulsion (to do the right thing)." (Hawke's Bay Packhouse)*

- Support with council interactions: Growers were typically happy with NZAPI's level of industry advocacy, although there was widespread disappointment at the response of local and district councils, who seemed more focused on housing and water supply. Dealing with councils during/following the cyclone was a challenge for many. Is there a role for NZAPI to work with them to plan for future crises, to ensure better support for the industry?
- Improve response coordination across similar organisations such as the Tairāwhiti Growers Association, Hawke's Bay Fruit Growers Association, HortNZ, etc.
- Media management: Needed a coordinated industry-wide process for media enquiries, to ensure consistent messaging. As a minimum, instruct anyone approached by media to contact an agreed NZAPI person.



Section 5

Building a more resilient industry

Building a more resilient industry

The events surrounding Cyclone Gabrielle in February 2023, and its aftermath, provided the apple and pear industry with some valuable lessons on how to improve resilience. The cyclone revealed the vulnerabilities of permanent horticulture on floodplains and stressed the need for better crisis management frameworks. The industry structure and networks were highlighted as very different across Hawke's Bay and Tairāwhiti-Gisborne and as such, the response activity needs differed also. NZAPI should use these experiences to build on its communication, leadership, and technical responses, with the aim of being more prepared for future challenges.

Communication Lessons Learnt

Effective communication during a crisis is essential for recovery and resilience. This review emphasised the importance of clear, timely, and locally relevant messaging. In the aftermath of Cyclone Gabrielle, face-to-face communication became critical, as power and phone networks were down. Community efforts, such as checking in on neighbours, also played a vital role in ensuring safety when emergency services were stretched thin.

The review further highlighted the necessity of having a communication plan prepared in advance. While NZAPI successfully shared technical information, directly engaging people in Tairāwhiti-Gisborne was more challenging. However, owing to a well-coordinated dissemination network, these members still received the technical recommendations through their packhouses, and the consultants who were able to travel to the region.

It was apparent that consistently sharing the same recommendations via a network of trusted contacts was key to limiting misinformation, ensuring response actions taken across the industry were the most suited to the situation, and were based on credible information sources.

Moving forward, the review recommended tailoring messages to the specific needs of different areas, ensuring information is clear and practical, and using a variety of communication methods such as digital updates, social media, and face-to-face meetings. The overarching goal is to create a communication framework that not only addresses technical needs but is also sensitive to the emotional well-being of those affected.

Leadership Lessons Learnt

Leadership played a key role in the cyclone response, showing both strengths and gaps in the industry's crisis management. NZAPI's technical efforts were more successful in Hawke's Bay for several key reasons: there is a large, well-networked pipfruit industry in Hawke's Bay; most growers only grow pipfruit; NZAPI, consultants and scientists who all service the pipfruit industry were locally based and easily accessible following the cyclone. Conversely, Tairāwhiti-Gisborne has a smaller less well-networked pipfruit industry; most orchards are multi-crop; and local horticultural experts are pan-crop specialists, and thus less pipfruit-specific expertise is locally available. Their physical distance from the post-cyclone pipfruit expertise meant Tairāwhiti-Gisborne pipfruit growers faced challenges in receiving technical recommendations relevant to their local situation.

The review highlighted the importance of having clear leadership roles and being prepared to act quickly. Key positions like the Flood Response Manager and Science Lead were essential for coordinating efforts, securing expertise, and putting science-based solutions into action. Additionally, bringing in a panel of local technical experts to work with the response leaders provided valuable local knowledge and expertise, helping to tackle the complex issues the industry faced after Cyclone Gabrielle.

However, the absence of local technical leadership (specific to pipfruit) in Tairāwhiti-Gisborne was a clear gap. Looking ahead, plans should focus on establishing clear leadership structures, fairly distributing resources, and engaging with local communities to make sure responses are tailored to regional needs.

Technical Lessons Learnt

The technical response to Cyclone Gabrielle focused on risk management and operational recovery. Some key areas of focus included:

- Impact and risk assessments
- Food safety protocols
- Harvesting and bin management
- Orchard and tree recovery
- Pest and disease control
- Market access and phytosanitary information.

These strategies helped the industry address both immediate and long-term challenges, ensuring continuity in production and market access. The technical lessons showed the need for ongoing research, updated operational guidelines, and strong monitoring systems to help the industry bounce back after future crises.

Cyclone Gabrielle exposed significant vulnerabilities in the apple and pear industry but also provided important lessons on how to respond and recover from such events. Continuing to learn from the disaster is crucial, especially when it comes to understanding the long-term effects on crops following flooding. Unfortunately, there has been little research funding to continue monitoring the affected orchards, and there are several areas that need further investigation, such as the impacts of different silt types, flood duration, how well different crops and rootstocks tolerate oxygen deprivation, and the application of phos acid.

> *"there's a lot of information out there to be gained and be captured right now. And, unfortunately, you know, everybody's moving on too quickly. How do we prepare ourselves for the future, when we can learn a lot from the response that we see now particularly on the different soil types, and with different crops?" (Hawke's Bay Technical Taskforce)*

By focusing on effective communication, adaptable leadership, and technical innovation, NZAPI aims to create a more resilient horticultural industry. These lessons not only improve preparedness for future crises but also provide a solid foundation for the long-term sustainability of the industry.


New Zealand
Apples & Pears