



Detection of *Pseudomonas syringae* pv. *actinidiae* from leaves and pollen collected from symptomatic and asymptomatic *Actinidia chinensis* in Te Puke, Bay of Plenty

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1. Executive Summary

Project Purpose

The main objectives of this work are to:

- (a) estimate the prevalence of *Pseudomonas syringae* pv. *actinidiae* (Psa) in symptomatic and asymptomatic leaf and pollen material;
- (b) determine if viable Psa V populations are present in pollen;
- (c) verify the reliability and specificity of PCR tests for the large scale detection of Psa in infected samples; and
- (d) provide new information that will enable industry to make more informed decisions about the risks associated with artificial pollination.

During this project 694 leaf and 676 pollen (extracted from closed male flowers) samples from symptomatic and asymptomatic vines of *Actinidia chinensis* (ZESPRI GOLD[®] kiwifruit) were collected and tested for the presence of Psa. Symptomatic vines were those male kiwifruit vines showing primary and/or secondary symptoms, or were adjacent to infected kiwifruit vines. Asymptomatic vines were vines with no visual evidence of disease on the vine or in the orchard block.

Key Findings

PCR tests:

- Psa was detected in 84% of leaf material sampled from symptomatic vines and 22% from asymptomatic vines.
- Psa was detected in 51% of pollen samples extracted from closed flowers sampled from symptomatic vines and 13% of pollen sampled from asymptomatic vines.
- PCR of leaf material was more sensitive (91%; 95% credible interval CI 86-96%) and specific (96%; CI 93-100%) than PCR of pollen (Se. 55%; CI 49-61%; Sp. 91%; CI 87-94%) or culture of pollen (Se. 19%; CI 15-23%; Sp. 96%; CI 94-98%).
- These tests have potential for establishing freedom from infection for monitoring orchards on which infection has not been observed (test combination with moderate sensitivity and high specificity). Testing leaf and pollen in series (vine negative if either test is negative) would increase specificity to 99.8% (CI 99.7-100%; at sensitivity 49%, CI 43-55%).
- Tests can also be used to establish or confirm infection and estimate the prevalence of infected vines within a block or orchard (high sensitivity, moderate specificity). Testing leaf and pollen in parallel (vine negative if either test is negative) would increase sensitivity to 98.0% (93.2-99.8%).

Bacterial isolations:

- The isolation of Psa from pollen onto semi-selective media (KBC) was found to be more efficient than isolating onto generic media (King's B).
- Viable Psa colonies were isolated from 16% of pollen samples collected from symptomatic vines and from 4% of pollen samples from asymptomatic vines.
- A range of 10^2 – 10^4 colony forming units (cfu) of Psa was found to be present in 8 mg of pollen (8 mg was the approximate amount of pollen extracted from the flower sample for isolation of bacteria onto media).
- Psa colonies isolated from pollen were characterised as Psa V. Psa LV was not detected.

The results from this project provide new information that shows:

- Viable Psa V populations are associated with freshly harvested kiwifruit pollen extracted from closed flowers sampled from male plants of *A. chinensis* Ck2, Ck3 and Bruce.
- There is a relationship between the severity of symptoms observed in the orchard and incidence of Psa-infested pollen. The frequency with which viable Psa colonies were isolated from pollen ranged from 16% for pollen sampled from symptomatic vines, to 4% for pollen sampled from asymptomatic vines.

These results demonstrate that viable Psa is associated with freshly collected pollen **but what is not known** is whether:

- Psa is associated with pollen of *Actinidia deliciosa* (green kiwifruit) in the same way as it is with *A. chinensis*;
- Psa remains viable in commercially milled pollen or in storage; or
- Psa is transmitted from infested pollen to a susceptible host and causes disease.

Further work is required to answer these questions and the requirements of such a research programme are being considered.

A considerable amount of data was collected that could be used in other analyses, e.g. the spatial distribution of the pathogen and disease incidence across symptomatic and asymptomatic orchards. It is recommended to KVH that the dataset is analysed further to provide additional insights into the ecology and epidemiology of Psa.

2. Introduction

Pseudomonas syringae pv. *actinidiae* (Psa) was detected in New Zealand in November 2010 (Everett et al. 2011). Subsequent testing and characterisation of the pathogen showed that it was very similar to the aggressive Psa strain that has caused significant losses to kiwifruit vines in Italy (Chapman et al. 2011). In New Zealand this strain is widely known as Psa V and in the last 12 months it has had a devastating affect on the kiwifruit industry. Two Psa haplotypes are present in New Zealand. The Psa V haplotype is currently restricted to the Bay of Plenty and to the Pukekohe region, it is highly virulent and is associated with leaf spot and canker symptoms. The Psa LV haplotype is much more widespread in New Zealand, it is weakly virulent and is currently associated with only leaf spot symptoms. Efforts to contain the disease in New Zealand include movement controls on plant propagative material and restrictions on the use of artificial application of pollen in the orchard. There is very little information available on the ecology and epidemiology of Psa on kiwifruit under New Zealand conditions. Further knowledge is required on the association and viability of Psa on symptomless plants and pollen. This information is of particular importance to assist in decisions on the appropriateness of management controls for the movement of nursery stock and will also provide new data that will enable industry to make more informed decisions about the risks associated with artificial pollination.

There is some information available on the association of Psa collected from symptomatic and asymptomatic leaves and pollen. Psa has been detected by PCR from leaf and flower material collected from symptomatic and asymptomatic kiwifruit vines (Vanneste et al. 2011b). In the Vanneste et al. study, the presence of Psa was detected by PCR in three of the four flower samples tested, however, no attempt was made to isolate the pathogen. Psa was isolated regularly from symptomatic leaves and on two occasions it was isolated from symptomless leaves collected from diseased orchards (Vanneste et al. 2011b). Psa has been detected in commercially milled New Zealand pollen by PCR but despite numerous attempts a pure culture of Psa has never been directly isolated from commercial pollen (MPI, unpublished data). Consequently, it has not been possible to determine if the Psa detected in pollen is viable, to determine the strain type or to validate test results by other methodology. There are a number of possible reasons why Psa has not been isolated from samples of pollen which had tested PCR positive for example; the growth of a low concentration of Psa cells may have been swamped by fast growing bacteria, or the PCR was detecting non-viable cells.

If Psa is viable in pollen the best opportunity to isolate the bacterium is likely to be from pollen freshly collected from the flowers of infected kiwifruit vines. In New Zealand pollen for commercial milling is collected by harvesting unopened male kiwifruit flowers at the “popcorn” stage.

In this project, leaves and pollen (from closed male flowers) sampled from infected and non-infected kiwifruit vines were tested using a new PCR test developed by Plant & Food Research Ltd (PFR) that distinguishes between Psa haplotypes (Templeton et al. unpublished) and a published PCR test (Rees-George et al. 2010), and direct isolation of the bacterium onto semi-selective media. The main objectives of this work were to: (i) to estimate the prevalence of Psa in symptomatic and asymptomatic leaf and pollen material; (ii) to determine if viable Psa V populations are present in pollen; (iii) to verify the reliability and specificity of PCR tests for the large scale detection of Psa-infected samples; (iv) and to provide further information on the risks associated with artificial pollination. Tests for the presence of Psa were done on leaf and pollen from orchard blocks with severe disease and from blocks showing few or no symptoms.

3. Materials and Methods

3.1 SAMPLING AND SURVEY DESIGN

Leaf and flower material from vines of *Actinidia chinensis* (ZESPRI GOLD® kiwifruit) were sampled from four orchards located in Te Puke, Bay of Plenty. It is recognised that pollen for commercial purposes is collected from *Actinidia deliciosa*. However, *Actinidia chinensis* was sampled in this project to make use of the opportunity to collect samples from heavily infected plants during flowering.

The selected orchards had varying levels of Psa symptoms ranging from a few solitary vines to severely symptomatic blocks (Figure 1). Specific details are provided in Tables 1 and 2.

Figure 1. Psa symptoms observed in the orchard at the time of sample collection.



Table 1. Orchards surveyed for sample collection.

Orchard location	Sampling dates	MPI accession no.	Blocks	No. of vines sampled	Symptom prevalence
Baygold – 47 Old Coach Road, Te Puke	20-21 October 2011	T11_04010	Taupo	54	High
			Tarawera	54	Low
Baygold – La Vigna 80 Roydon Downs Road, Te Puke	20-21 October 2011	T11_04011	Napoli	52	High
			Positano	104	Low
	27-28 October 2011	T11_04101	Venice	26	High
			Latina	100	Low*
John May 15 Casurina Drive, Te Puke	27-28 October 2011	T11_04102	North	13	Low
			South	100	Low
Robbie Ellison Rangiruru Road, Te Puke	27-28 October 2011	T11_04103	1	52	Low
			2	23	Low
			3	33	Low
			8	43	High
			9	40	High

*Latina block samples were collected from non-symptomatic vines. The block was initially thought to have no symptoms; however, a disease pocket was located near centre of the block.

Table 2. Sampling strata and units.

Strata	Sampling unit	Strata definition
High prevalence samples	10 male flowers (popcorn stage) and 5 symptomatic leaves adjacent to popcorn flowers	<u>Symptomatic vines:</u> Male plants showing secondary Psa V symptoms; or Male plants adjacent to Psa V infected kiwifruit gold vines; or Male plants showing primary Psa V and Psa LV symptoms
Low prevalence samples	10 male flowers (popcorn stage) and 5 leaves adjacent to popcorn flowers	<u>Asymptomatic vines:</u> Male plants that are asymptomatic for primary and secondary Psa V symptoms

Samples were collected from 14 blocks in four orchards. Samples were sourced from either “high prevalence” or “low prevalence” blocks. High prevalence samples were defined as “symptomatic vines” where the affected male kiwifruit vines were either showing primary and/ or secondary symptoms or were adjacent to infected kiwifruit vines. The low prevalence population was defined as “asymptomatic vines” where samples were collected from vines with no visual evidence of disease on the vine or in the orchard block.

The total sample size was 331 affected and 363 non-affected vines. This sample size was chosen in order to provide a 95% confidence level of detecting Psa if analysed by maximum likelihood methods.

Ten closed male flowers at the “popcorn stage” and five fresh leaves were collected from each vine. Samples were collected in a manner that ensured that no plant was touched without gloves. Leaves and flowers were collected by enclosing them in zip-lock plastic bags and then detaching from the plant, i.e. the gloved hand did not come into contact with the sample. The zip-lock bag was sealed and given a unique sample number. Samples were double bagged and placed into a storage box with an ice pack. All samples were transferred from the field and refrigerated at 4°C until analysis.

3.2 SAMPLE PREPARATION

3.2.1 Leaf preparation for bacterial isolation and PCR detection

3.2.1.1 Bacterial isolations

Small tissue pieces from leaf spot margins were removed aseptically, ground in bacteriological saline (0.85% w/v NaCl), and left at room temperature (c. 20°C) for 10 min. Aliquots of 100 µl were streaked onto KBC (a semi-selective medium for *Pseudomonas syringae* pathovars; Mohan and Schaad 1987) or King’s medium B (KB) and incubated at 26°C. Bacterial colonies growing from the suspensions were re-streaked onto KB to obtain pure cultures.

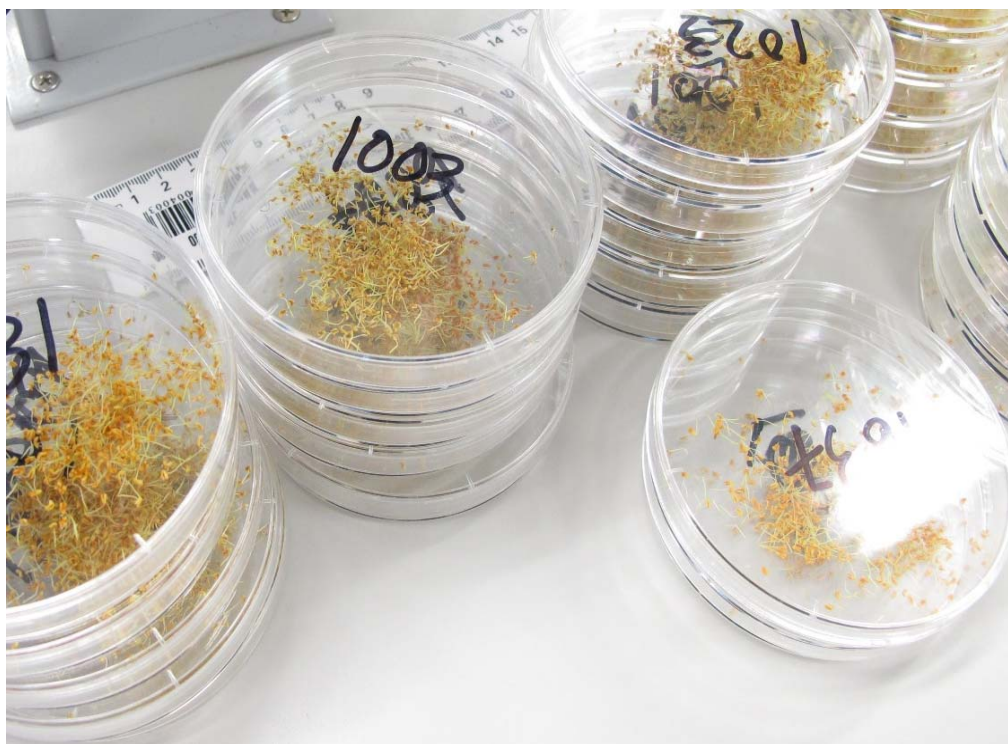
3.2.1.2 DNA extractions

Each sample consisted of 0.2 g of leaf material (taken from the five leaves and bulked), which was macerated in 5 ml of CTAB buffer.

3.2.2 Pollen extraction from closed flowers for bacterial isolation and PCR detection

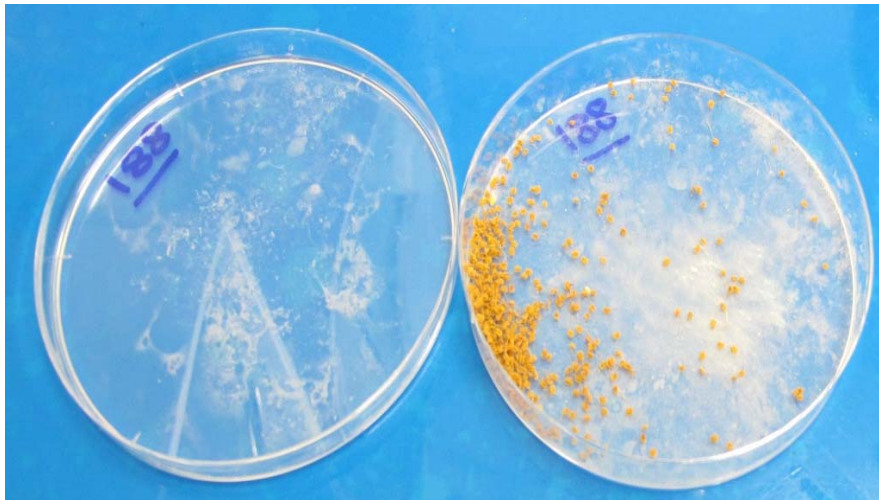
Each sample for pollen extraction consisted of 10 flowers. From these flowers the petals were removed using surface sterilised (70% ethanol) stainless-steel forceps, and the filaments with attached anthers were excised and placed into a sterile 90 mm plastic Petri dishes labelled with a unique sample number (Figure 2).

Figure 2. Filaments with attached anthers removed from flower buds.



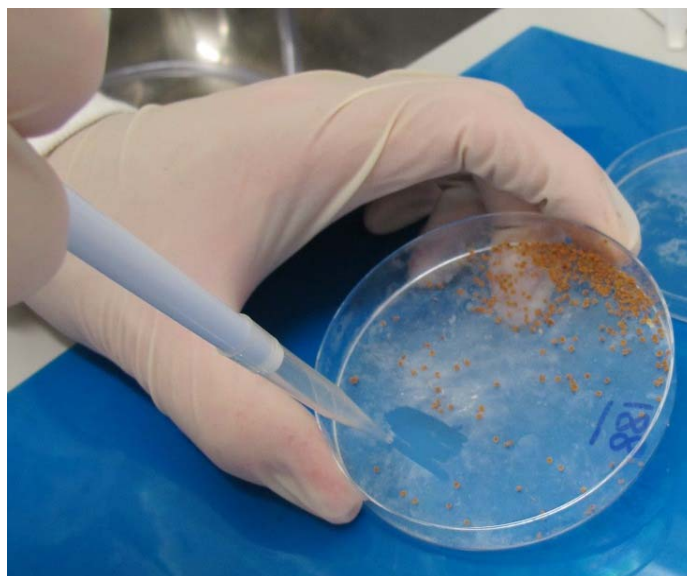
The anthers and filaments were dried overnight by incubation at 25°C, facilitating pollen release. After drying each Petri dish was tapped sharply on the bench to enhance pollen release from the anthers (Figure 3). Approximately 16-18 mg of pollen was extracted from each 10-flower sample. One half of each pollen sample was used for DNA extraction and tested by PCR; the other half was for bacterial isolation onto KBC.

Figure 3. Pollen released from dried anthers.



The pollen grains were vacuumed into a sterile 1 ml barrier pipette tip with a Venturi pump (Figure 4). The bore size of the pipette tip prevented anthers/filaments from entering the tip thus separating pollen grains from filaments. Half the pollen from a sample was vacuumed into one pipette tip and this was then placed into a sterile 15 ml screw-capped centrifuge tube for bacterial isolation. The remaining pollen was vacuumed into another sterile 1 ml pipette tip and pipetted into a 1.5 ml microfuge tube containing 1 ml of CTAB buffer. The suspension was vortexed and the tube placed horizontally on a shaker for 30 min at maximum speed (250 rpm). DNA was then extracted from the pollen samples suspended in CTAB buffer using the Thermo KingFisher method as described below.

Figure 4. Collection of the released pollen.



The 15 ml centrifuge tube containing the other 1 ml pollen-containing tip was centrifuged for 4 minutes at 3000 rpm to collect the pollen in the bottom of the tube. The pollen was re-suspended in 5 ml of 0.85% sterile saline solution, vortexed and aliquots of 100 μ l were spread onto KBC and incubated for 3 days at 25°C. All Psa suspect cultures were stored at -80°C.

3.3 DNA EXTRACTION

3.3.1 Leaf tissue

DNA was extracted from leaf tissue in accordance with the procedure listed in Section 3.1.1.1 of the MPI “Diagnostic Protocol for Detection of Psa in Leaf Samples” (Appendix 1).

3.3.2 Pollen

The pollen suspensions were centrifuged for 2 min at 1,000 rpm (very low speed). 500 µl of the supernatant transferred to a 1.5 ml microcentrifuge tube containing 25 µl Proteinase K. The tubes were incubated at 65°C for 10 min with shaking, then centrifuged for 2 min at 13,000 rpm. 420 µl of the supernatant was then extracted using the InviMag[®] Plant DNA Mini Kit and Thermo Kingfisher methods in accordance with the manufacturer’s protocol. The purified nucleic acid was stored at – 80°C.

3.3.3 Bacterial culture

A loopful of bacteria taken from individual colonies was re-suspended in a 1 ml of 0.85% sterile saline solution and 10 µl DNA was extracted using the Sigma-Aldrich Extract-N-Amp[™] Tissue PCR Kit, following the protocol provided by the manufacturers.

3.4 PCR TESTING FOR PSA

PCR testing of plant tissue and of bacterial colonies was performed using the DNA primers developed by Rees George et al. (2010) in a real-time PCR protocol as described in Section 3.2 of the MPI “Diagnostic Protocol for Detection of Psa in Leaf Samples” (Appendix 1).

3.5 PSA STRAIN CHARACTERISATION

The haplotype of Psa isolates was determined by sequencing the three genes *gyrB*, *HrpK* and *cts*, using the methods described in Chapman et al. (2011), or by using the PCR developed by Plant and Food Research (PFR) test that distinguishes Psa V and Psa LV (Templeton et al. unpublished).

4. Results

4.1 PCR DETECTION OF PSA ON SYMPTOMATIC AND ASYMPTOMATIC LEAF SAMPLES

Psa was detected by PCR in 84% of leaf samples collected from symptomatic vines and 22% collected from asymptomatic vines (Table 3; Appendix 2). A representative selection of the positive samples was further tested using the PFR test and DNA sequencing, and confirmed to be positive for Psa V.

Table 3. PCR detection of leaf material collected from orchards infected with Psa.

Psa prevalence in orchard block	Leaf samples positive
High prevalence	277/331 (84%)
Low prevalence	83/363 (22%)

4.2 PCR DETECTION OF PSA ON POLLEN EXTRACTED FROM CLOSED FLOWERS SAMPLED FROM SYMPTOMATIC AND ASYMPTOMATIC KIWIFRUIT VINES

Psa was detected in 51% of samples collected from symptomatic vines and 13% of samples collected from asymptomatic vines by PCR (Table 4; Appendix 2). A representative selection of the positive samples was further tested using the PFR test and DNA sequencing, and confirmed to be positive for Psa V.

Table 4. Isolation and PCR detection of pollen extracted from closed flowers sampled from symptomatic and asymptomatic kiwifruit gold vines.

Psa prevalence in orchard block	PCR detection	Isolation
High prevalence	170/331 (51 %)	54/331 (16%)
Low prevalence	46/345 (13%)	16/345 (4%)

4.3 ISOLATION AND CHARACTERISATION OF PSA BACTERIAL COLONIES ASSOCIATED WITH LEAF AND POLLEN SAMPLES

Psa-like colonies were observed on both KBC and King's B media after 3 days at 26°C (Figure 5). KBC was clearly more selective for Psa and was used for all the isolations from pollen (Figure 5). The pathogen was isolated in 16% of samples collected from pollen sourced from symptomatic vines and 4% of samples from pollen sourced from closed flowers collected from asymptomatic vines (Table 4). Psa was isolated onto KBC from 8 pollen samples that tested negative by PCR (Appendix 2). This is likely to be due to variation between samples containing low populations of Psa that are not homogeneously distributed. To confirm the culture-based results all colonies were tested by PCR. Colonies with cycle threshold (Ct) values below 30 were considered positive for Psa.

Figure 5. Bacterial colonies isolated from pollen extracts. A. Psa colonies on KBC (semi-selective) medium isolated from pollen. B. Bacterial colonies on KB medium isolated from the same pollen extract. Note that the Psa colonies on KB are being overgrown by other competing bacteria.



Based on the sample size tested there were no clear differences observed in the detection of Psa on leaves (Table 5) or pollen (Table 6) extracted from flowers sampled from the Ck2, Ck3 and Bruce male kiwifruit varieties.

Table 5. PCR detection of Psa on leaves sampled from different male kiwifruit varieties.

Psa prevalence in orchard block	Ck2	Ck3	Bruce
High prevalence	30/37 (81%)	37/41 (90%)	208/251 (82%)
Low prevalence	1/34 (2.9%)	0/56 (0%)	82/284 (28.8%)

Table 6. PCR detection of Psa in pollen extracted from closed flowers sampled from different male kiwifruit varieties.

Psa prevalence in orchard block	Ck2	Ck3	Bruce
High prevalence	16/37 (43%)	19/41 (46%)	133/251 (52%)
Low prevalence	0/34 (0%)	7/56 (12.5%)	39/284 (13.7%)

5. Discussion

The methods used in this project readily detected *Psa* and isolated viable colonies from leaves and from pollen extracted from closed flowers, sampled from symptomatic and asymptomatic kiwifruit vines. By comparing the isolation of bacteria from 50 pollen samples onto KBC and KB media it was shown that the KBC medium was more efficient for the selective isolation of *Psa* colonies from pollen (data not shown). The KBC medium markedly reduced the large numbers of background saprophytic bacteria isolated from pollen thereby improving the chances of successful isolation of *Psa* (Figure 5). The PFR PCR test was used in this project to validate results from bacterial culture, leaf and pollen tissue and to determine the haplotype of *Psa* strains detected. Preliminary work with this PCR test showed that the assay was highly specific in distinguishing *Psa* haplotypes, however, detection sensitivity in plant tissue and pollen was significantly less than that of the Rees George et al. (2010) PCR test (data not shown). The two PCR tests amplify different DNA regions present in single (PFR test) or multiple (Rees George test) copies in the *Psa* genome which may explain the observed differences in detection sensitivity. Alternatively the reduction in detection sensitivity may be due differences in laboratory equipment and reagents; MPI is collaborating with PFR to optimise the test.

During this study viable *Psa* colonies were isolated for the first time in New Zealand from pollen collected from closed male kiwifruit flowers sampled from Hort16A orchards. The association of *Psa* with pollen was confirmed both by PCR and direct bacterial isolation. *Psa* cultures were isolated from 54 (16%) pollen samples harvested from closed male flowers collected from symptomatic vines and from 16 (4%) pollen samples from asymptomatic vines. Bacterial colonies isolated from pollen were confirmed to be *Psa* V by two diagnostic PCR tests and DNA sequence analysis of the *gyrB*, *hrpK* and *cts* genes. The range of populations of *Psa* V was estimated to be approximately $10^2 - 10^4$ cfu in 8mg of pollen extract. The fact that viable cells of *Psa* V were isolated from pollen harvested from closed flowers confirms the association of *Psa* V with pollen and infers that the pathogen has the ability to colonise flower buds before they open. The isolation of viable *Psa* colonies from samples that were PCR positive, including samples that gave weak PCR positive results, provided further confidence in PCR test results.

During the initial response to the disease, *Psa* was detected in commercially milled New Zealand pollen by PCR but despite numerous attempts a pure culture of *Psa* could not be isolated. It is likely that *Psa* could be successfully cultured in the current study because freshly harvested pollen, and a selective medium, was used and that this work should be completed on milled pollen to assess viability of *Psa* in this situation. It is possible that some aspect of the commercial milling process or storage conditions further reduces the small *Psa* populations likely to be present in pollen at harvest. It is recommended that jarred pollen samples collected from previous seasons are retested using KBC medium to see if viable *Psa* colonies can be isolated.

The frequency of detecting *Psa* was 84% for leaves sampled from symptomatic vines and 24% for leaves sampled from asymptomatic vines. The results show that there is a correlation between the severity of symptoms observed in the orchard and the incidence of *Psa* in leaves and pollen sampled from the orchard. It appears that *Psa* has the ability to survive on both leaf and flower tissue from asymptomatic kiwifruit vines and that potentially these populations could provide a source of inoculum.

On two asymptomatic blocks from different orchards, *Psa* was detected by PCR and direct bacterial isolation on pollen collected from closed flowers sampled from asymptomatic vines.

This is similar to previous results obtained by MPI during the initial stages of the response, where Psa was detected by PCR in pollen from orchards with no symptoms. Vanneste et al. (2011a) also obtained a similar finding by isolating Psa from pollen sourced from Italian orchards where no symptoms of bacterial canker had been detected. However, this result has important implications since the collection of flowers from areas that appear visually free of disease may not be sufficient to ensure that harvested pollen is free of Psa.

A statistical analysis on prevalence and test performance conducted by the EpiCentre, Massey University is documented in appendix 1. The key findings from this analysis showed that PCR of leaf material was more sensitive (91%; 95% credible interval CI 86-96%) and specific (96%; CI 93-100%) than PCR of pollen (Se. 55%; CI 49-61%; Sp. 91%; CI 87-94%) or culture of pollen (Se. 19%; CI 15-23%; Sp. 96%; CI 94-98%). The results also show that these tests can be used for establishing freedom from infection for orchard monitoring on which infection has not been observed (test combination with moderate sensitivity and high specificity). Testing leaf and pollen in series (vine negative if either test is negative) would increase specificity to 99.8% (CI 99.7-100%; at sensitivity 49%, CI 43-55%). Testing 80 leaf samples from a non-affected orchard by PCR would provide 93% power of detecting an infection prevalence of 10% or more when 6 or more positive samples would define the orchard as infected; this strategy would keep the risk of a false positive outcome, i.e. declaring the orchard as infected when it is not, below 4%. If 1-5 of 80 samples were positive it is recommended to test pollen from positive vines by culture and declare freedom from infection when all samples are culture negative (else positive). Tests could also be used to establish or confirm infection and estimate the prevalence of infected vines within a block or orchard (high sensitivity, moderate specificity). Testing leaf and pollen in parallel (vine negative if either test is negative) would increase sensitivity to 98.0% (93.2-99.8%).

To conclude, our findings show that viable Psa V populations are associated with freshly harvested kiwifruit pollen from *A. chinensis* male varieties Ck2, Ck3 and Bruce indicating that such populations are likely to be present in flowers harvested for commercial pollen milling. While these results provide insights into the association and viability of Psa on freshly collected pollen they do not answer questions regarding (a) the ability of Psa to survive on commercially milled pollen and in storage; and (b) whether Psa can spread from infested pollen to a susceptible host and cause disease. It should also be noted that pollen used commercially for artificial pollination is generally collected from *Actinidia deliciosa* (green kiwifruit) and it is not known whether the results from this study on *A. chinensis* can be extrapolated to *A. deliciosa*. Further work is required to answer these questions and the requirements of such a research programme are being considered by MPI and KVH.

This project has collected a considerable amount of data that could be used in other analyses for example, the spatial distribution of the pathogen and disease incidence across symptomatic and asymptomatic orchards. It is recommended that this dataset is analysed further to provide additional insights into the ecology and epidemiology of Psa.

6. Acknowledgements

MPI is grateful to the kiwifruit growers who participated in this project by willingly providing their time and access to their orchards to collect samples. We are also grateful to all the AsureQuality, EpiCentre, MPI, KVH and Zespri staff that assisted with various aspects of the project.

7. References

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8. Appendix 1

Detection of *Pseudomonas syringae* pv. *actinidiae* from leaf and pollen samples collected from symptomatic and asymptomatic kiwifruit gold (*A. chinensis*) vines in Te Puke, Bay of Plenty

Report of Prevalence and test Performance

Date: 01 January 2012

Subj.: Report of an investigation on PSA in Kiwifruit orchards in the Bay of Plenty, Oct-Dec 2011

Ref.: EDR – MAF/Massey contract no. D0297 – EpiCentre Request dated 05 October –

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Report of Prevalence and test Performance

Key Findings:

- Psa colonies isolated by culture from pollen have been characterised as Psa-V.
- The estimated ‘true prevalence’ (i.e. adjusted for lack of test accuracy) of infected vines ranged 16-38% on orchard blocks with ‘low symptom prevalence’ and 17-65% on blocks with ‘high symptom prevalence’.
- PCR of leaf material was more sensitive (91%; 95% credible interval CI 86-96%) and specific (96%; CI 93-100%) than PCR of pollen (Se. 55%; CI 49-61%; Sp. 91%; CI 87-94%) or culture of pollen (Se. 19%; CI 15-23%; Sp. 96%; CI 94-98%).
- These tests can be used for establishing freedom from infection for monitoring the state orchards on which infection has not been observed (test combination with moderate sensitivity and high specificity). Testing leaf and pollen in series (vine negative if either test is negative) would increase specificity to 99.8% (CI 99.7-100%; at sensitivity 49%, CI 43-55%).
 - Testing 80 leaf samples from a non-affected orchard by PCR would provide 93% power of detecting an infection prevalence of 10% or more when 6 or more positive samples would define the orchard as infected; this strategy would keep the risk of a false positive outcome, i.e. declaring the orchard as infected when it is not, below 4%. If 1-5 of 80 samples were positive it is recommended to test pollen from positive vines by culture and declare freedom from infection when all samples are culture negative (else positive).
- Tests can also be used to establish or confirm infection and estimate the prevalence of infected vines within a block or orchard (high sensitivity, moderate specificity). Testing leaf and pollen in parallel (vine negative if either test is negative) would increase sensitivity to 98.0% (93.2-99.8%).
 - Using the leaf-PC, 240 samples would be required to estimate 20% prevalence with +/-5% error, i.e. the 95% confidence interval of the estimate would range 15-25%.

Objectives

The overall objective was to provide new information that will enable industry to make more informed decisions about the risk of introducing Psa into kiwi orchards associated with artificial pollination. The specific objectives for this report were:

- (a) Estimating the prevalence of *Pseudomonas syringae* pv. *actinidiae* (Psa) in symptomatic and asymptomatic leaf and pollen material;
- (b) Evaluating the accuracy of PCR tests on pollen and leaf material, and of culture on pollen, for the detection of Psa in leaf and pollen and for estimating prevalence in asymptotically infected and known infected orchards;
- (c) Designing a sampling scheme for monitoring orchards for ‘freedom from infection’.

Methods

Details of aims, size and process of sampling are included in an internal MAF report of 6 December 2011. A brief summary relevant for this analysis is given below.

Sample size

This sample size was chosen to provide a 95% confidence and 80% power of detecting a 10% difference in Psa prevalence between the high and low orchard blocks if analysed by maximum likelihood methods. The prevalence of infected vines in the non-symptomatic stratum was assumed to be 10% (low prevalence stratum). This required a sample size of 195 vines per stratum. Because vines were collected from several orchard blocks and different orchards, the sample size was approximately doubled to adjust for the correlation of test

results within block. This resulted in a total targeted sample size of about 390 vines from each of the two strata.

Table 1: Definition of the two sampling strata high and low prevalence of symptomatic vines

Stratum	Definition
High prevalence samples	‘Symptomatic vines’ from orchards or blocks within orchard: male plants showing secondary PsaV symptoms adjacent to PsaV infected kiwifruit gold vines; or male plants showing primary PsaV and PsaLV symptoms.
Low prevalence samples	‘Asymptomatic vines’ from orchards or blocks within orchard: male plants that did not show primary or secondary PsaV symptoms

Vines were sourced from both “high prevalent” or “low prevalent” blocks. High and low prevalence strata were defined as shown in Table 1. The high prevalence stratum is referred to as “symptomatic vines”, the low prevalence stratum as “asymptomatic vines”.

Collection of samples

The sampling unit was a male vine. Ten closed flowers at the “popcorn stage” and five fresh leaves adjacent to these popcorn flowers were collected from each male vine. Samples were collected in a manner that ensured that no plant was touched without gloves and leaf and flowers were collected by enclosing them in zip-lock plastic bags and then detaching from the plant, i.e. the gloved hand did not come into contact with the sample. The zip-lock bag was sealed and given a unique sample number. Samples were double bagged and placed into a storage box with an ice pack. All samples were transferred from the field and refrigerated at 4°C until analysis.

Statistical analysis

A latent class Bayesian model was developed to estimate the sensitivity and specificity of the PCR of leaf, the PCR of pollen and the culture test of pollen materials. The model was generalized from the two-test, two-population model described by (Johnson et al., 2001), and extended to a three-test, two-population scenario. The model did not assume a-priori that the three tests were conditionally independent, that is, a sample from an infected vine that was positive in one test might be more likely to also be positive in another test, than a sample from a non-infected vine. Therefore, the model included parameters estimating this conditional between the three tests. The model also included a block effect to adjust estimates of sensitivity, specificity and prevalence of vines in ‘symptomatic’ and ‘asymptomatic’ blocks. The inclusion of these block effects allowed to estimate the prevalence within each block. In addition, vine variety was included (Bruce, CK2, CK3). However, variety was later removed because variety did not affect either of the parameters of interest, and was itself not a significant factor.

The estimates were derived from the median of the posterior distributions of the parameters and associated 95% credible intervals. The model was fitted using WinBUGS (Spiegelhalter et al., 1996) and was run for 100,000 iterations, after discarding a burn-in period of 5,000.

Results

Leaf and flower material from kiwifruit gold vines were sampled from 14 blocks in 4 orchards located in Te Puke, Bay of Plenty. These orchards had varying levels of Psa symptoms ranging from a few solitary vines to severely symptomatic blocks. A total of 331 'symptomatic' and 363 'asymptomatic' vines were collected.

Psa was detected in 84% (277/331) of leaf samples collected from 'symptomatic vines' and 22% (83/363) collected from 'asymptomatic vines' by PC. A representative number of the positive samples were further tested using the PFR test and confirmed to be positive for PsaV.

Table 2 shows results from vines that were tested by all three tests and were therefore available for statistical analysis. This included 682 vines, 320 vines from 'symptomatic' and 362 vines from 'asymptomatic' blocks.

Table 2: Positive and negative test results sampled from 14 orchard blocks of 3 properties with high/low symptom prevalence in leaf and pollen from total of 682 vines.

Orchard	Block	Date	Vines	Prev.	L_pcr+	L_pcr-	P_pcr+	P_pcr-	P_cul+	P_cul-
Baygold	Positano	20-21 Oct'11	98	low	0	98	10	88	1	97
Baygold	Latina	27-28 Oct'11	97	low	36	61	19	78	5	92
Baygold	Tarawera	20-21 Oct'11	52	low	0	52	0	52	2	50
J.May	South	27-28 Oct'11	97	low	84	13	68	29	20	77
J.May	North	27-28 Oct'11	12	low	1	11	1	11	1	11
R.Ell.	1	27-28 Oct'11	52	low	6	46	12	40	6	46
R.Ell.	2	27-28 Oct'11	21	low	2	19	1	20	1	20
R.Ell.	3	27-28 Oct'11	30	low	4	26	0	30	0	30
Baygold	Napoli	20-21 Oct'11	50	high	27	23	19	31	3	47
Baygold	Taupo	20-21 Oct'11	52	high	39	13	12	40	3	49
Baygold	Venice	27-28 Oct'11	26	high	25	1	16	10	2	24
R.Ell.	8	27-28 Oct'11	43	high	34	9	22	21	8	35
R.Ell.	9	27-28 Oct'11	40	high	36	4	22	18	16	24
R.Ell.	Ellis.Nth.	27-28 Oct'11	12	high	0	12	0	12	1	11

The prevalence of infected vines in the two populations of symptomatic and non-symptomatic orchard blocks, adjusted for the lack of attest accuracy, was clearly and highly significantly different (Figure 1). Thus, the intention of sampling from different populations was successful, thus the assumption by Bayesian latent class analysis of different prevalence difference was satisfied.

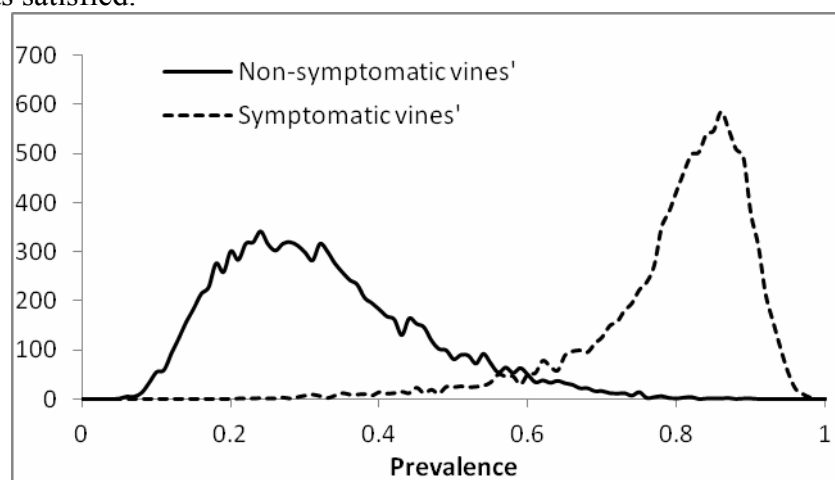


Figure 1: Posterior density of the prevalence of infected vines in the 'symptomatic' and 'non-symptomatic' orchard blocks.

Individual orchard blocks followed the assumed pattern of high and low prevalence with the exception of one orchard with an almost zero estimated prevalence in the assumed 'symptomatic' vine population (Figure 2).

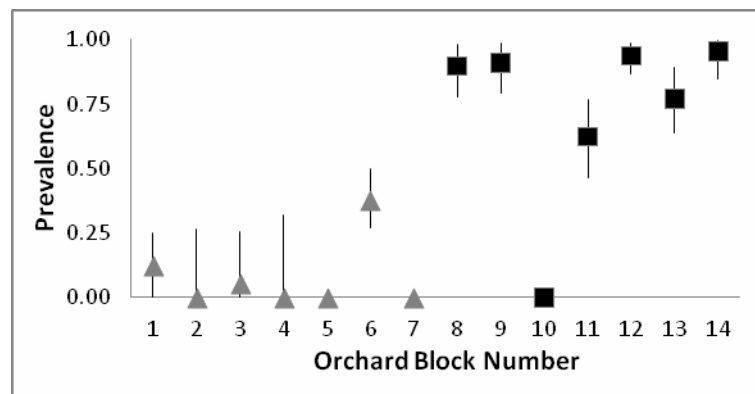


Figure 2: Individual prevalence by orchard block in 'symptomatic' (black squares) and 'non-symptomatic' (grey triangles) vines

The other assumption of conditional independence was tested by adding six parameters estimating the correlation between tests, i.e. 1 vs 2, 1 vs 3, 2 vs 3 of infected and of non-infected vines. The posterior kernel densities of the parameters demonstrated that testing pollen material resulted in conditional dependence of both, infected and non-infected vines, whereas the PCR of leaves did not correlate with PCR or culture results from pollen (Figure 3).

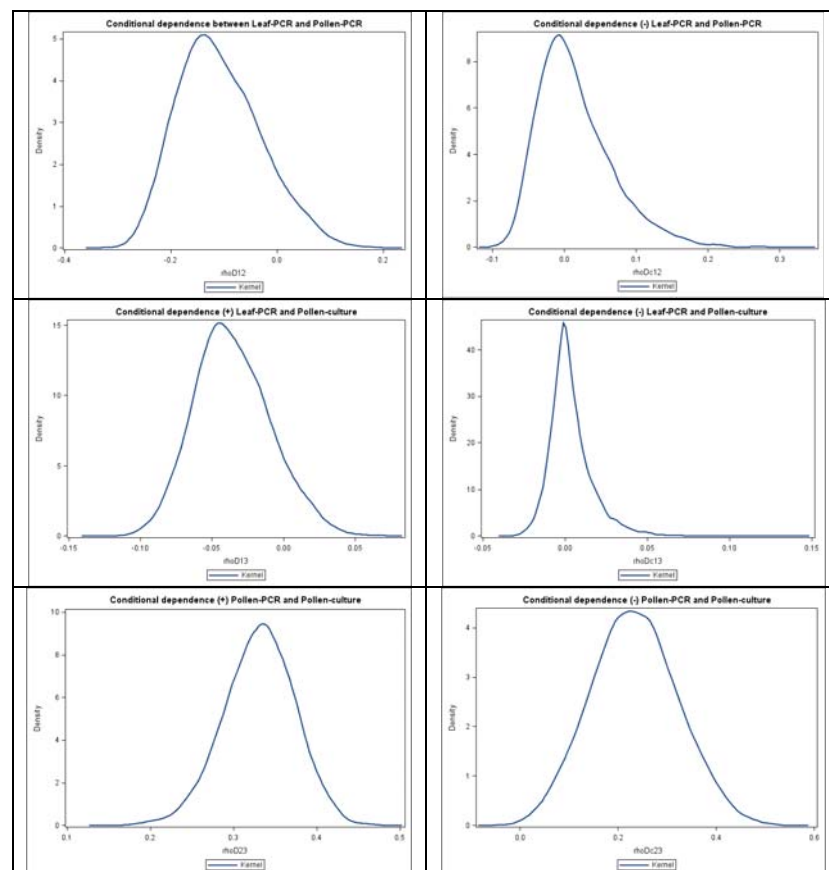


Figure 3: Posterior kernel densities of conditional dependence between tests: pollen-PCR and pollen-culture test results correlated for both, infected and non-infected vines (diagrams in lower row) whereas leaf-PCR correlated with none of the pollen tests.

Thus, the leaf-PCR can be combined with either pollen-PCR or pollen-culture to achieve higher sensitivity if the emphasis is on Psa-V infection (parallel interpretation, i.e. either test positive = ‘vine infected’) or to maximise specificity (serial interpretation, i.e. both positive = ‘vine infected’). However, it is not advisable to combine pollen PCR and pollen culture as one test is to some extent predictable by the other, thus not yielding independent additional information.

The posterior density estimates for sensitivity and specificity of the three tests are plotted in Figure 4. Table 3 lists mean, standard deviation, median and 95% credible interval (CI = 2.5%ile - 97.5%ile). There were distinct, substantial differences between the test sensitivities: PCR on leaf material was highest with a median estimate of 92% (CI 86 - 96%), followed by PCR on pollen (55, CI 49 – 61%), and culture of pollen material (19%, CI 15 – 23%).

Specificity was high for both leaf-PCR and pollen-culture, but rather poor for PCR on pollen material. Reasons for these large differences in performance parameters need to be discussed.

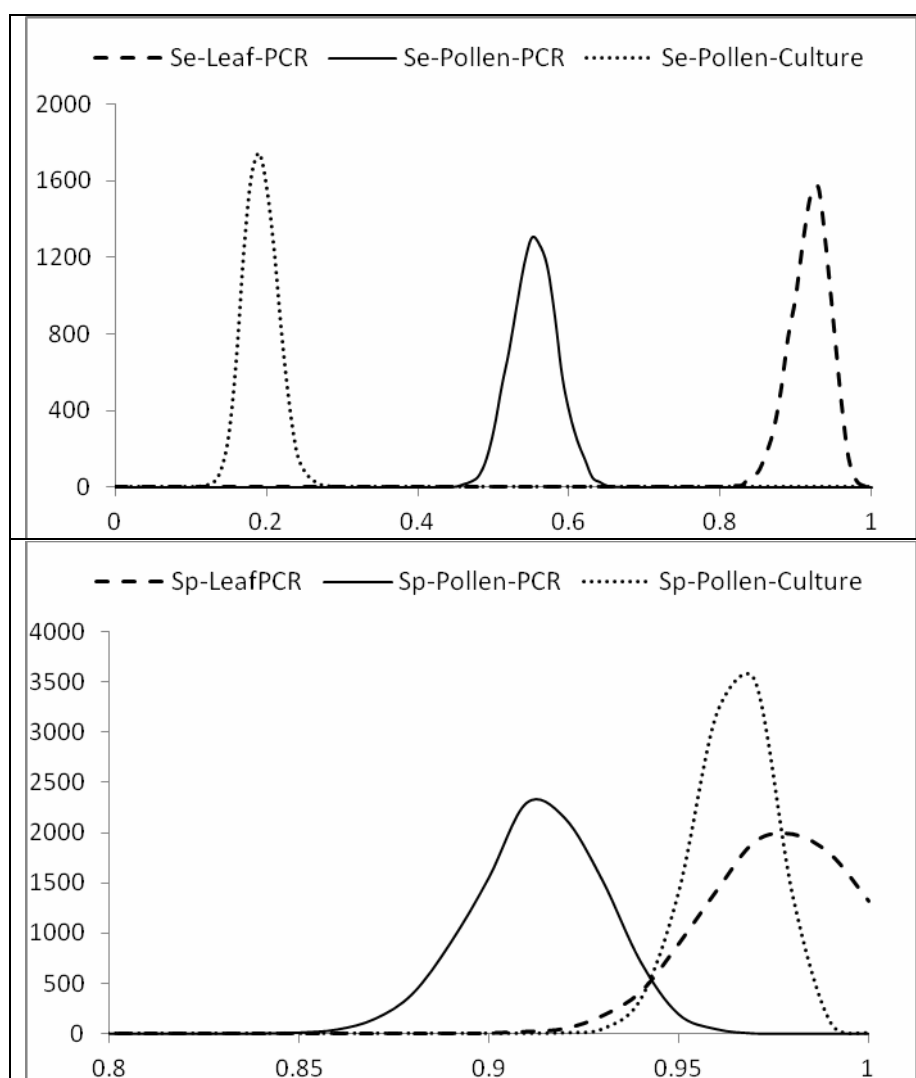


Figure 4: Posterior kernel densities of sensitivity (upper) and specificity (lower) estimates for Leaf-PCR, Pollen-PCR and Pollen-Culture.

Table 3: Posterior estimates of sensitivity and specificity for the three tests.

	Mean	Stdev.	2.50%	Median	97.50%
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Sensitivity

Leaf-PCR	91.4%	2.6%	85.8%	91.6%	95.9%
Pollen-PCR	54.8%	3.0%	49.0%	54.8%	61.0%
Pollen-Culture	18.7%	2.2%	14.6%	18.6%	23.3%

Specificity

Leaf-PCR	96.9%	1.8%	93.0%	97.1%	99.7%
Pollen-PCR	90.8%	1.7%	87.2%	90.9%	94.0%
Pollen-Culture	95.9%	1.0%	93.7%	96.0%	97.7%

All estimates derived from Bayesian latent class analysis were highly precise despite a sample that was 88% (682/790) of the targeted size. This was largely due to the substantial infection difference between populations. Moreover, a sensitivity analysis the assumed priors for infection prevalence and test accuracy had little or no influence on the results. The inclusion of parameters for a conditional correlation between tests adjusted for a violation of this assumption of independence in the case of pollen-PCR and pollen-culture.

Acknowledgement

This work was a joint effort by workers at Massey and MPI. The authors like to thank Paul Bingham, MPI Team Manager Surveillance and Investigation for initiating the liaison and managing the response.

9. Appendix 2

MPI Diagnostic Protocol for Detection of Psa in Leaf Samples (Protocol Version: 18 March 2011) [Relevant sections only]

3.1 DNA Extraction

- Use a standardised form to track accession numbers, DNA extraction location in freezer boxes and any comments that may be on sample bags to facilitate tracking of DNA extractions. See Appendix B for a Nucleic Acid Extraction Sheet example.
- These forms are kept together in a central location.
- There are two alternative methods for the extraction of nucleic acid from leaves:
 - Option 1: InviMag[®] Plant DNA Mini Kit and Thermo Kingfisher ml (Invitex, Germany)
 - Option 2: QIAGEN DNeasy[®] Plant Mini Kit (Biostrategy, New Zealand)

These methods give similar DNA quality and quantity. Option 1 is the faster method.

3.1.1 Extraction Using InviMag Plant DNA Mini Kit and Thermo Kingfisher

REAGENTS

<u>CTAB buffer</u>	<u>For 1 L</u>
2.5% (w/v) CTAB	25 g
100 mM Tris-HCl	100 ml of 1 M Tris-HCl, pH 8.0
50 mM EDTA	100 ml of 0.5 M EDTA, pH 8.0
1.4 M NaCl	82 g
1% (w/v) PVP-40	10 g

- Add Tris-HCl and EDTA to ~500 ml water and warm with stirring to ~70°C.
- Add NaCl, then PVP-40 and finally CTAB (wait for each chemical to dissolve before adding the next one; note that CTAB will not dissolve immediately).
- Keep stirring at ~70°C until dissolved.
- Top up with distilled water to 1L and store at room temperature

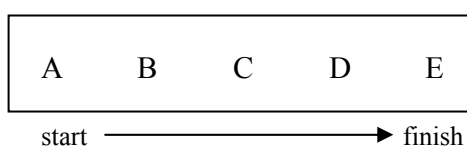
EQUIPMENT

Balance
 Cutting board
 Grinding bags
 Microcentrifuge tubes and racks
 10ml, 1000µl, 200µl, 20µl pipettors and tips
 Sterile transfer pipettes
 Microcentrifuge

3.1.1.1 KingFisher Protocol

1. Tissue from up to five symptomatic leaves may be bulked for testing. Use a balance to tare a grinding bag (Bioreba). Using sterile razor blades or a scalpel, remove 1cm x 1cm tissue sections containing lesions from each symptomatic leaf and place in the bag using the razor blade or sterile forceps to handle the leaf segments. **Change gloves and wipe the bench with 70% ethanol between accessions to prevent cross-contamination.**

2. Add 5 ml CTAB to the grinding bag using a 10 ml disposable pipette, Gilson pipette or repeating pipettor attached to the CTAB bottle. Change pipette/tip between each sample. If using a repeating pipettor, take care to ensure tip does not touch the bag, and clean with 70% ethanol if it does.
3. Grind the leaf tissue in the grinding bag using a homogeniser or end of a blunt instrument (Sharpie pens work well). Ensure that the entire leaf sample is ground well, but do not grind too hard to avoid breaking open the bag.
4. Place bags containing grindate upright in a container (e.g. ice-cream box) and allow the grindate to drain briefly. Remove 1 ml of grindate to a microcentrifuge tube and centrifuge for 2 minutes.
5. Use 420 μ l of the supernatant for the Kingfisher extraction (in Well A).
6. Set up and preload the KingFisher ml system with the InviMag[®] Plant DNA mini Kit/ KFml reagents as per the schematic below.
7. Place sheaths on magnetic probes and place 5-well strip tubes in silver tray. Load the 5-well strip tubes as follows:



Well A	20 μ l = Magnetic beads (SNAP solution A) (use at room temp) 200 μ l = Binding buffer 420 μ l = Sample
Well B	800 μ l Wash buffer I
Well C	800 μ l Wash buffer II
Well D	800 μ l Wash buffer II
Well E	100 μ l = Elution buffer D

Pre-programmed steps (total run time approx 25 min)	Step	Run time
Well A	Premix and binding	5 min
Well B	1 st Wash beads	1 min 30 sec
Well C	2 nd Wash beads	1 min
Well D	3 rd Wash beads	30 sec
AIR DRY BEADS		8 min
Well E	Elution of NA from beads	3 min

8. Collect nucleic acid from Well E and transfer to a labelled micro-centrifuge tube for storage at -80°C .

3.1.2 Extraction Using QIAGEN DNeasy Plant Mini Kit

3.1.2.1 QIAGEN Protocol

Bench Protocol: DNeasy Plant Mini

Note: Before using this bench protocol, you should be completely familiar with the safety information and detailed protocols in the DNeasy Plant Handbook.

Important points before starting

Perform all centrifugation steps at room temperature ($15\text{--}25^{\circ}\text{C}$).

If necessary, redissolve any precipitates in Buffers AP1 and AP3/E concentrate.
 Ensure that ethanol has been added to Buffers AW and AP3/E.
 Preheat a water bath or heating block to 65°C.

Procedure

1. Disrupt the sample material (≤ 100 mg wet weight or ≤ 20 mg lyophilized tissue) using the TissueRuptor, the TissueLyser, or a mortar and pestle.
2. Add 400 μ l **Buffer AP1** and 4 μ l **RNase A**. Vortex and incubate for 10 min at 65°C. Invert tube 2–3 times during incubation.
Note: Do not mix Buffer AP1 and RNase A before use.
3. Add 130 μ l **Buffer AP2**. Mix and incubate for 5 min on ice.
 Recommended: Centrifuge the lysate for 5 min at 20,000 x g (14,000 rpm).
4. Pipette the lysate into a **QIAshredder** Mini spin column in a 2 ml collection tube. Centrifuge for 2 min at 20,000 x g (14,000 rpm).
5. Transfer the flow-through fraction into a new tube without disturbing the pellet. Add 1.5 volumes of **Buffer AP3/E**, and mix by pipetting.
6. Transfer 650 μ l of the mixture into a **DNeasy** Mini spin column in a 2 ml collection tube. Centrifuge for 1 min at ≥ 6000 x g (≥ 8000 rpm). Discard flow-through. Repeat this step with the remaining sample.
7. Place the spin column into a new 2 ml collection tube. Add 500 μ l **Buffer AW**, and centrifuge for 1 min at ≥ 6000 x g. Discard flow-through.
8. Add another 500 μ l **Buffer AW**. Centrifuge for 2 min at 20,000 x g.
 Note: Remove the spin column from the collection tube carefully so the column does not come into contact with the flow-through.
9. Transfer the spin column to a new 1.5 ml or 2 ml microcentrifuge tube, and add 100 μ l **Buffer AE** for elution. Incubate for 5 min at room temperature. Centrifuge for 1 min at ≥ 6000 x g. Repeat this step.

Use the eluted DNA immediately in a PCR test, or store at -80°C for later testing.

3.2 PCR Assays

DNA extracts can be tested by either conventional or real-time PCR. For both assays, primers from Rees-George et al. (2010) are used.

For either assay, an internal control must be included (universal primers 28sf and 28sr (Werren et al. 1995) for the conventional PCR and COX primers (Weller et al. 2000) for the real-time.

Each PCR worksheet is given a unique number and all worksheets are maintained together in a central location.

Positive controls are available from the Ministry of Agriculture and Forestry's Plant Health & Environment Laboratory (PHEL). Contact Brett Alexander for more information

brett.alexander@MPI.govt.nz

It is not necessary to sequence every positive result. At PHEL positive results from each new infection area are sequenced using the PsaF1/PsaR2 primer pair. For more information on sequencing please contact PHEL.

For technical advice regarding unusual results, please contact PHEL.

3.2.1 Real-time PCR Testing

3.2.1.1. Reagents

Primers

Targeted organism	Primer name	Primer sequence (5'-3')	Reference
Psa	PsaF1	TTTTGCTTTGCACACCCGATTTT	Rees-George et al. (2010) Plant Pathology 59: 453-464
	PsaR2	CACGCACCCTTCAATCAGGATG	
Internal control	COX-F	CGTCGCATTCCAGATTATCCA	Weller et al. (2000) Applied and Enviro Micro 66: 2853-2858
	COX-R	CAACTACGGATATATAAGAGCCAAAACCTG	

- SsoFast™ EvaGreen® Supermix, BIO-RAD
500 reactions, Catalogue # 172-5201

3.2.1.3 Interpretation of Results

A score sheet is included on the worksheet. **For PCR tests on leaf tissue:** Reactions with a Ct value under 30 are considered positive. Reactions with Ct values of 30 to 35 are considered weak positive. Reactions that produce Ct values > 35 are negative. **For PCR tests on pollen:** Reactions with a Ct value under 37 are considered positive. Reactions with Ct values of 37 to 42 are considered weak positive. Reactions that produce Ct values > 42 are negative. **For PCR tests on bacterial cultures:** Reactions with a Ct value under 30 are considered positive. Reactions that produce Ct values > 30 are negative.

For weak positives, if the assay was performed on a bulked sample, the DNA from each leaf should be extracted separately and the PCR repeated on the separate extracts. Ensure that the positive and negative control provide expected results for each run.

3.2.2 Conventional PCR Testing

3.2.2.1 Reagents

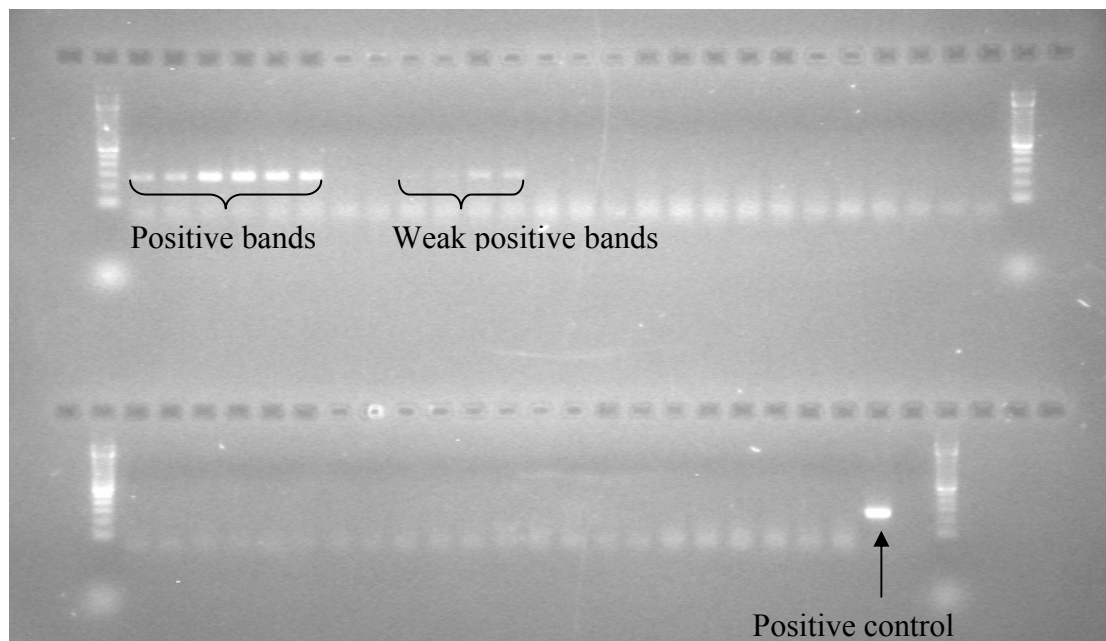
- Primers

Targeted organism	Primer name	Primer sequence (5'-3')	Reference
Psa	PsaF1	TTTTGCTTTGCACACCCGATTTT	Rees-George et al. (2010) Plant Pathology 59: 453-464
	PsaR2	CACGCACCCTTCAATCAGGATG	
Internal control	28sf	CCCTGTTGAGCTTGACTCTAGTCTGGC	Werren et al. (1995) Proceeding Royal Society London Series B 262: 197-204
	28sr	AAGAGCCGACATCGAAGGATC	

- Promega Go Taq Green 1000 reactions Catalogue # M7123

3.2.2.3 Interpretation of Results

Strong bands on the gel, equivalent to the positive control or brighter should be considered clear positives. Faint bands denote a weak positive and the reaction should be repeated. For weak positives, if the assay was performed on a bulked sample, the DNA from each leaf should be extracted separately and the PCR repeated on the separate extracts. Ensure that the positive and negative controls are included in each run and provide expected results.



10. Appendix 3

Project Survey Details and Test Results

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
1	0001	Tarawera	2	2	Leaf	Ck3	L	Negative	0	
1	0002	Tarawera	2	2	Flower	Ck3	L	Negative	0	Negative
2	0003	Tarawera	2	5	Leaf	Ck2	L	Negative	0	
2	0004	Tarawera	2	5	Flower	Ck2	L	Negative	0	Negative
3	0005	Tarawera	2	7	Leaf	Ck3	L	Negative	0	
3	0006	Tarawera	2	7	Flower	Ck3	L	Negative	0	Negative
4	0007	Tarawera	2	10	Leaf	Ck2	L	Negative	0	
4	0008	Tarawera	2	10	Flower	Ck2	L	Negative	0	Negative
5	0009	Tarawera	2	13	Leaf	Ck3	L	Negative	0	
5	0010	Tarawera	2	13	Flower	Ck3	L	Negative	0	Negative
6	0011	Tarawera	2	16	Leaf	Ck2	L	Negative	0	
6	0012	Tarawera	2	16	Flower	Ck2	L	Negative	0	Negative
7	0013	Tarawera	3	1	Leaf	Ck3	L	Negative	0	
7	0014	Tarawera	3	1	Flower	Ck3	L	Negative	0	Negative
8	0015	Tarawera	3	4	Leaf	Ck2	L	Negative	0	
8	0016	Tarawera	3	4	Flower	Ck2	L	Negative	0	Negative
9	0017	Tarawera	3	7	Leaf	Ck3	L	Negative	0	
9	0018	Tarawera	3	7	Flower	Ck3	L	Negative	0	Negative
10	0019	Tarawera	3	10	Leaf	Ck2	L	Weak positive	31.59	
10	0020	Tarawera	3	10	Flower	Ck2	L	Negative	0	Negative
11	0021	Tarawera	3	13	Leaf	Ck3	L	Negative	0	
11	0022	Tarawera	3	13	Flower	Ck3	L	Negative	0	Negative
12	0023	Tarawera	3	16	Leaf	Ck2	L	Negative	0	
12	0024	Tarawera	3	16	Flower	Ck2	L	Negative	0	Negative
13	0025	Tarawera	3	19	Leaf	Ck3	L	Negative	0	
13	0026	Tarawera	3	19	Flower	Ck3	L	Negative	0	Negative
14	0027	Tarawera	4	18	Leaf	Ck2	L	Negative	0	
14	0028	Tarawera	4	18	Flower	Ck2	L	Negative	0	Negative
15	0029	Tarawera	4	15	Leaf	Ck2	L	Negative	0	
15	0030	Tarawera	4	15	Flower	Ck2	L	Negative	0	Negative
16	0031	Tarawera	4	12	Leaf	Ck3	L	Negative	0	
16	0032	Tarawera	4	12	Flower	Ck3	L	Negative	0	Negative
17	0033	Tarawera	4	6	Leaf	Ck3	L	Negative	0	
17	0034	Tarawera	4	6	Flower	Ck3	L	Negative	0	Negative
18	0035	Tarawera	4	3	Leaf	Ck2	L	Negative	0	Negative
18	0036	Tarawera	4	3	Flower	Ck2	L	Negative	0	Negative
19	0037	Tarawera	5	2	Leaf	Ck2	L	Negative	0	
19	0038	Tarawera	5	2	Flower	Ck2	L	Negative	0	Negative
20	0039	Tarawera	5	5	Leaf	Ck3	L	Negative	0	
20	0040	Tarawera	5	5	Flower	Ck3	L	Negative	0	Negative
21	0041	Tarawera	5	8	Leaf	Ck2	L	Negative	0	
21	0042	Tarawera	5	8	Flower	Ck2	L	Negative	0	Negative
22	0043	Tarawera	5	11	Leaf	Ck2	L	Negative	0	
22	0044	Tarawera	5	11	Flower	Ck2	L	Negative	0	Negative
23	0045	Tarawera	5	14	Leaf	Ck3	L	Negative	0	
23	0046	Tarawera	5	14	Flower	Ck3	L	Negative	0	Negative
24	0047	Tarawera	5	17	Leaf	Ck3	L	Negative	0	

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
24	0048	Tarawera	5	17	Flower	Ck3	L	Negative	0	Negative
25	0049	Tarawera	5	20	Leaf	Ck2	L	Negative	0	
25	0050	Tarawera	5	20	Flower	Ck2	L	Negative	0	Negative
26	0051	Tarawera	8	20	Leaf	Ck3	L	Negative	0	
26	0052	Tarawera	8	20	Flower	Ck3	L	Negative	0	Negative
27	0053	Tarawera	8	17	Leaf	Ck2	L	Negative	0	
27	0054	Tarawera	8	17	Flower	Ck2	L	Negative	0/46.92	Negative
28	0055	Tarawera	8	11	Leaf	Ck2	L	Negative	0	
28	0056	Tarawera	8	11	Flower	Ck2	L	Negative	0	Negative
29	0057	Tarawera	8	8	Leaf	Ck3	L	Negative	0	
29	0058	Tarawera	8	8	Flower	Ck3	L	Negative	0	Negative
30	0059	Taupo	50	10	Leaf	Ck3	H	Positive	28.26	
30	0060	Taupo	50	10	Flower	Ck3	H	Negative	0	Negative
31	0061	Taupo	48	16	Leaf	Ck2	H	Negative	37.34	
31	0062	Taupo	48	16	Flower	Ck2	H	Negative	0	Negative
32	0063	Taupo	48	12	Leaf	Ck3	H	Positive	29.89	
32	0064	Taupo	48	12	Flower	Ck3	H	Negative	0	Negative
33	0065	Taupo	48	8	Leaf	Ck2	H	Weak positive	33.17	
33	0066	Taupo	48	8	Flower	Ck2	H	Negative	0	Negative
34	0067	Taupo	48	5	Leaf	Ck3	H	Positive	23.82	
34	0068	Taupo	48	5	Flower	Ck3	H	Negative	0/46.2	Negative
35	0069	Taupo	48	2	Leaf	Ck2	H	Negative	0	
35	0070	Taupo	48	2	Flower	Ck2	H	Negative	0	Negative
36	0071	Taupo	47	5	Leaf	Ck3	H	Positive	18.12	
36	0072	Taupo	47	5	Flower	Ck3	H	Negative	0	Negative
37	0073	Taupo	47	8	Leaf	Ck2	H	Negative	0	
37	0074	Taupo	47	8	Flower	Ck2	H	Negative	0	Negative
38	0075	Taupo	47	11	Leaf	Ck3	H	Negative	0	
38	0076	Taupo	47	11	Flower	Ck3	H	Weak positive	40.32	Negative
39	0077	Taupo	47	14	Leaf	Ck3	H	Weak Positive	34.18	
39	0078	Taupo	47	14	Flower	Ck3	H	Negative	0	Negative
40	0079	Taupo	46	13	Leaf	Ck2	H	Negative	36.71	Negative
40	0080	Taupo	46	13	Flower	Ck2	H	Negative	0	Negative
41	0081	Taupo	46	10	Leaf	Ck3	H	Positive	24.89	
41	0082	Taupo	46	10	Flower	Ck3	H	Negative	0	Negative
42	0083	Taupo	46	7	Leaf	Ck2	H	Negative	35.48	
42	0084	Taupo	46	7	Flower	Ck2	H	Negative	0	Negative
43	0085	Taupo	45	6	Leaf	Ck3	H	Weak positive	32.8	
43	0086	Taupo	45	6	Flower	Ck3	H	Negative	0	Negative
44	0087	Taupo	45	9	Leaf	Ck2	H	Negative	0	
44	0088	Taupo	45	9	Flower	Ck2	H	Negative	0	Negative
45	0089	Taupo	45	12	Leaf	Ck3	H	Negative	0	
45	0090	Taupo	45	12	Flower	Ck3	H	Not collected		
46	0091	Taupo	45	15	Leaf	Ck2	H	Positive	25.4	
46	0092	Taupo	45	15	Flower	Ck2	H	Negative	0	Negative
47	0093	Taupo	44	14	Leaf	Ck3	H	Negative	0	
47	0094	Taupo	44	14	Flower	Ck3	H	Negative	0	Negative
48	0095	Taupo	44	11	Leaf	Ck3	H	Negative	0	
48	0096	Taupo	44	11	Flower	Ck3	H	Negative	0	Negative
49	0097	Taupo	44	8	Leaf	Ck2	H	Negative	0	

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
49	0098	Taupo	44	8	Flower	Ck2	H	Negative	0	Negative
50	0099	Taupo	44	5	Leaf	Ck3	H	Positive	20.58	
50	0100	Taupo	44	5	Flower	Ck3	H	Negative	0	Negative
51	0101	Tarawera	12	1	Flower	Ck2	L	Negative	0	Negative
51	0102	Tarawera	12	1	Leaf	Ck2	L	Negative	0	
52	0103	Tarawera	12	4	Flower	Ck3	L	Negative	0	Negative
52	0104	Tarawera	12	4	Leaf	Ck3	L	Negative	0	
53	0105	Tarawera	12	7	Flower	Ck2	L	Negative	0	Negative
53	0106	Tarawera	12	7	Leaf	Ck2	L	Negative	0	
54	0107	Tarawera	12	10	Flower	Ck3	L	Weak positive	41.62	Negative
54	0108	Tarawera	12	10	Leaf	Ck3	L	Negative	0	
55	0109	Tarawera	12	13	Leaf	Ck2	L	Negative	0	
55	0110	Tarawera	12	13	Flower	Ck2	L	Negative	0	Negative
56	0111	Tarawera	12	16	Flower	Ck3	L	Negative	0	Negative
56	0112	Tarawera	12	16	Leaf	Ck3	L	Negative	0	
57	0113	Tarawera	12	19	Flower	Ck2	L	Negative	0/48.20	Negative
57	0114	Tarawera	12	19	Leaf	Ck2	L	Negative	0	Negative
58	0115	Tarawera	12	22	Flower	Ck3	L	Negative	0	Negative
58	0116	Tarawera	12	22	Leaf	Ck3	L	Negative	0	
59	0117	Tarawera	14	6	Flower	Ck2	L	Negative	0	Negative
59	0118	Tarawera	14	6	Leaf	Ck2	L	Negative	0	
60	0119	Tarawera	15	4	Flower	Ck2	L	Negative	0	Negative
60	0120	Tarawera	15	4	Leaf	Ck2	L	Negative	0	
61	0121	Tarawera	14	6	Flower	Ck3	L	Negative	0	Negative
61	0122	Tarawera	14	6	Leaf	Ck3	L	Negative	0	
62	0123	Tarawera	14	9	Flower	Ck2	L	Negative	0	Negative
62	0124	Tarawera	14	9	Leaf	Ck2	L	Negative	0	
63	0125	Tarawera	15	10	Flower	Ck2	L	Negative	0	Negative
63	0126	Tarawera	15	10	Leaf	Ck2	L	Negative	0	
64	0127	Tarawera	14	12	Flower	Ck3	L	Negative	0	Negative
64	0128	Tarawera	14	12	Leaf	Ck3	L	Negative	0	
65	0129	Tarawera	15	13	Flower	Ck3	L	Negative	0	Negative
65	0130	Tarawera	15	13	Leaf	Ck3	L	Negative	0	
66	0131	Tarawera	14	15	Flower	Ck2	L	Negative	0	Negative
66	0132	Tarawera	14	15	Leaf	Ck2	L	Negative	0	
67	0133	Tarawera	15	16	Flower	Ck2	L	Negative	47.19	Positive
67	0134	Tarawera	15	16	Leaf	Ck2	L	Negative	0	
68	0135	Tarawera	14	18	Flower	Ck3	L	Negative	0	Positive
68	0136	Tarawera	14	18	Leaf	Ck3	L	Negative	0	
69	0137	Tarawera	15	19	Flower	Ck3	L	Negative	0	Negative
69	0138	Tarawera	15	19	Leaf	Ck3	L	Negative	0	
70	0139	Tarawera	14	21	Flower	Ck2	L	Negative	0/46.42	Negative
70	0140	Tarawera	14	21	Leaf	Ck2	L	Negative	0	
71	0141	Tarawera	14	24	Flower	Ck3	L	Negative	43.62	Negative
71	0142	Tarawera	14	24	Leaf	Ck3	L	Negative	0	
72	0143	Tarawera	15	26	Flower	Ck3	L	Negative	0	Negative
72	0144	Tarawera	15	26	Leaf	Ck3	L	Negative	0	
73	0145	Tarawera	16	15	Flower	Ck2	L	Negative	0	Negative
73	0146	Tarawera	16	15	Leaf	Ck2	L	Negative	0	
74	0151	Taupo	48	16	Flower	Ck2	H	Negative	46.03	Negative
74	0152	Taupo	48	16	Leaf	Ck2	H	Positive	16.61	
75	0153	Taupo	45	16	Flower	Ck3	H	Positive	27.55	Negative

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
75	0154	Taupo	45	16	Leaf	Ck3	H	Positive	16.73	
76	0155	Taupo	43	15	Flower	Ck2	H	Not collected		
76	0156	Taupo	43	15	Leaf	Ck2	H	Positive	15.89	
77	0157	Taupo	43	12	Flower	Ck3	H	Weak positive	36.51	Negative
77	0158	Taupo	43	12	Leaf	Ck3	H	Positive	16.47	
78	0159	Taupo	42	13	Flower	Ck3	H	Positive	32.48	Negative
78	0160	Taupo	42	13	Leaf	Ck3	H	Positive	16.13	
79	0161	Taupo	41	11	Flower	Ck2	H	Positive	23.57	Positive
79	0162	Taupo	41	11	Leaf	Ck2	H	Positive	17.22	
80	0163	Taupo	40	15	Flower	Ck3	H	Positive	32.77	Negative
80	0164	Taupo	40	15	Leaf	Ck3	H	Positive	17.52	
81	0165	Taupo	39	16	Flower	Ck3	H	Positive	27.98	Negative
81	0166	Taupo	39	16	Leaf	Ck3	H	Positive	16.01	
82	0167	Taupo	39	13	Flower	Ck2	H	Weak positive	35.17	Negative
82	0168	Taupo	39	13	Leaf	Ck2	H	Positive	15.92	
83	0169	Taupo	40	11	Flower	Ck2	H	Positive	33.63	Positive
83	0170	Taupo	40	11	Leaf	Ck2	H	Positive	16.11	
84	0171	Taupo	38	11	Flower	Ck3	H	Negative	0	Negative
84	0172	Taupo	38	11	Leaf	Ck3	H	Positive	17.19	
85	0173	Taupo	39	10	Flower	Ck3	H	Negative	0	Negative
85	0174	Taupo	39	10	Leaf	Ck3	H	Positive	15.54	
86	0175	Taupo	38	7	Flower	Ck2	H	Negative	0	Negative
86	0176	Taupo	38	7	Leaf	Ck2	H	Positive	18.84	
87	0177	Taupo	35	20	Flower	Ck3	H	Positive	33.24	Negative
87	0178	Taupo	35	20	Leaf	Ck3	H	Positive	20.76	
88	0179	Taupo	36	22	Flower	Ck2	H	Negative	0	Negative
88	0180	Taupo	36	22	Leaf	Ck2	H	Positive	17.63	
89	0181	Taupo	36	42	Flower	Ck3	H	Negative	0	Negative
89	0182	Taupo	36	42	Leaf	Ck3	H	Positive	16.37	
90	0183	Taupo	35	43	Flower	Ck3	H	Negative	0	Negative
90	0184	Taupo	35	43	Leaf	Ck3	H	Positive	16.31	
91	0185	Taupo	36	45	Flower	Ck2	H	Negative	0	Negative
91	0186	Taupo	36	45	Leaf	Ck2	H	Positive	15.98	
92	0187	Taupo	43	5	Flower	Ck3	H	Negative	0	Negative
92	0188	Taupo	43	5	Leaf	Ck3	H	Positive	16.12	
93	0190	Positano	65	10	Flower		H	Weak positive	37.6	Negative
93	0191	Positano	65	10	Leaf		H	Positive	18.23	
94	0192	Positano	65	10	Flower		H	Positive	28.97	Positive
94	0193	Positano	65	10	Leaf		H	Positive	15.34	Positive
95	0201	Taupo	44	2	Leaf	Ck2	H	Positive	18.29	
95	0202	Taupo	44	2	Flower	Ck2	H	Negative	0	Negative
96	0203	Taupo	43	4	Leaf	Ck3	H	Positive	18	
96	0204	Taupo	43	4	Flower	Ck3	H	Negative	0	Negative
97	0205	Taupo	43	7	Leaf	Ck2	H	Positive	20.11	
97	0206	Taupo	43	7	Flower	Ck2	H	Negative	0	Negative
98	0207	Taupo	43	10	Leaf	Ck3	H	Positive	23.34	
98	0208	Taupo	43	10	Flower	Ck3	H	Negative	0	Negative
99	0209	Taupo	43	14	Leaf	Ck2	H	Positive	21.31	
99	0210	Taupo	43	14	Flower	Ck2	H	Positive	34.68	Negative
100	0211	Taupo	43	16	Leaf	Ck3	H	Positive	16.96	
100	0212	Taupo	43	16	Flower	Ck3	H	Positive	28.06	Positive

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101	0213	Taupo	42	12	Leaf	Ck2	H	Positive	15.29	
101	0214	Taupo	42	12	Flower	Ck2	H	Negative	0	Negative
102	0215	Taupo	42	9	Leaf	Ck2	H	Positive	16.4	
102	0216	Taupo	42	9	Flower	Ck2	H	Negative	0	Negative
103	0217	Taupo	42	6	Leaf	Ck3	H	Positive	17.82	Weak positive
103	0218	Taupo	42	6	Flower	Ck3	H	Negative	0	Negative
104	0219	Taupo	42	3	Leaf	Ck2	H	Positive	15.73	
104	0220	Taupo	42	3	Flower	Ck2	H	Negative	0	Negative
105	0221	Taupo	41	2	Leaf	Ck3	H	Positive	16.63	
105	0222	Taupo	41	2	Flower	Ck3	H	Negative	0	Negative
106	0223	Taupo	41	8	Leaf	Ck2	H	Positive	16	
106	0224	Taupo	41	8	Flower	Ck2	H	Positive	34.78	Negative
107	0225	Taupo	41	11	Leaf	Ck3	H	Positive	16.19	
107	0226	Taupo	41	11	Flower	Ck3	H	Negative	0	Negative
108	0227	Taupo	41	14	Leaf	Ck2	H	Positive	21.82	
108	0228	Taupo	41	14	Flower	Ck2	H	Negative	0	Negative
109	0229	Positano	72	8	Leaf	Ck3	H	Positive	14.28	
109	0230	Positano	72	8	Flower	Ck3	H	Not collected		
110	0231	Positano	72	14	Leaf	Ck2	H	Positive	15.92	
110	0232	Positano	72	14	Flower	Ck2	H	Positive	34.47	Negative
111	0233	Positano	72	23	Leaf	Ck3	H	Positive	15.05	
111	0234	Positano	72	23	Flower	Ck3	H	Positive	27.97	Negative
112	0235	Positano	72	26	Leaf	Ck2	H	Positive	17.54	
112	0236	Positano	72	26	Flower	Ck2	H	Positive	31.09	Negative
113	0237	Positano	72	29	Leaf	Ck3	H	Positive	15.33	
113	0238	Positano	72	29	Flower	Ck3	H	Positive	24.98	Negative
114	0239	Positano	72	32	Leaf	Ck2	H	Positive	16.09	
114	0240	Positano	72	32	Flower	Ck2	H	Weak positive	38.24	Negative
115	0241	Positano	72	41	Leaf	Ck3	H	Positive	15.2	
115	0242	Positano	72	41	Flower	Ck3	H	Weak positive	36.7	Negative
116	0243	Positano	71	5	Leaf	Ck2	H	Positive	14.66	
116	0244	Positano	71	5	Flower	Ck2	H	Positive	27.7	Positive
117	0245	Positano	71	23	Leaf	Ck3	H	Positive	14.2	
117	0246	Positano	71	23	Flower	Ck3	H	Weak positive	35.95	Negative
118	0247	Positano	71	26	Leaf	Ck2	H	Positive	16.16	
118	0248	Positano	71	26	Flower	Ck2	H	Positive	27.44	Positive
119	0249	Positano	71	41	Leaf	Ck3	H	Positive	15.65	
119	0250	Positano	71	41	Flower	Ck3	H	Positive	30.65	Negative
120	0251	Positano	71	44	Leaf	Ck2	H	Positive	16.14	
120	0252	Positano	70	44	Flower	Ck2	H	Negative	0	Negative
121	0253	Positano	70	6	Leaf	Ck3	H	Positive	14.97	
121	0254	Positano	70	6	Flower	Ck3	H	Positive	29.02	Positive
122	0255	Positano	70	9	Leaf	Ck2	H	Positive	14.82	
122	0256	Positano	70	9	Flower	Ck2	H	Positive	33.67	Negative
123	0257	Positano	70	12	Leaf	Ck3	H	Positive	16.22	
123	0258	Positano	70	12	Flower	Ck3	H	Weak positive	35.22	Negative
124	0259	Positano	70	21	Leaf	Ck2	H	Positive	14.55	
124	0260	Positano	70	21	Flower	Ck2	H	Positive	18.6	Positive
125	0261	Positano	70	24	Leaf	Ck3	H	Positive	15.82	
125	0262	Positano	70	24	Flower	Ck3	H	Positive	22.25	Positive

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126	0263	Positano	70	27	Leaf	Ck2	H	Positive	14.8	
126	0264	Positano	70	27	Flower	Ck2	H	Positive	24.35	Negative
127	0265	Positano	70	30	Leaf	Ck3	H	Positive	15.56	
127	0266	Positano	70	30	Flower	Ck3	H	Positive	26.72	Negative
128	0267	Positano	70	32	Leaf	Ck2	H	Positive	15.16	
128	0268	Positano	69	32	Flower	Ck2	H	Positive	16.28	Positive
129	0269	Positano	69	29	Leaf	Ck3	H	Positive	14.62	
129	0270	Positano	69	29	Flower	Ck3	H	Positive	24.15	Positive
130	0271	Positano	69	26	Leaf	Ck2	H	Positive	13.82	
130	0272	Positano	69	26	Flower	Ck2	H	Weak positive	35.84	Negative
131	0273	Positano	69	23	Leaf	Ck3	H	Positive	14.59	
131	0274	Positano	69	23	Flower	Ck3	H	Positive	33.02	Negative
132	0275	Positano	69	12	Leaf	Ck2	H	Positive	15.05	
132	0276	Positano	69	12	Flower	Ck2	H	Positive	34.99	Negative
133	0301	Positano	62	1	Flower	Bruce	H	Positive	29.17	Positive
133	0302	Positano	62	1	Leaf	Bruce	H	Positive	14.69	
134	0303	Positano	63	2	Flower	Bruce	H	Positive	27.3	Positive
134	0304	Positano	63	2	Leaf	Bruce	H	Positive	17.8	
135	0305	Positano	62	4	Flower	Bruce	H	Weak positive	36.17	Positive
135	0306	Positano	62	4	Leaf	Bruce	H	Positive	13.65	
136	0307	Positano	63	5	Flower	Bruce	H	Positive	34.17	Positive
136	0308	Positano	63	5	Leaf	Bruce	H	Positive	14.96	
137	0309	Positano	62	7	Flower	Bruce	H	Positive	29.84	Negative
137	0310	Positano	62	7	Leaf	Bruce	H	Positive	15.25	
138	0311	Positano	63	8	Flower	Bruce	H	Positive	28.61	Positive
138	0312	Positano	63	8	Leaf	Bruce	H	Positive	16.85	
139	0313	Positano	62	10	Flower	Bruce	H	Positive	31.39	Negative
139	0314	Positano	62	10	Leaf	Bruce	H	Positive	15.9	
140	0315	Positano	63	11	Flower	Bruce	H	Positive	34.35	Negative
140	0316	Positano	63	11	Leaf	Bruce	H	Positive	14.78	
141	0317	Positano	62	13	Flower	Bruce	H	Positive	29.41	Negative
141	0318	Positano	62	13	Leaf	Bruce	H	Positive	13.41	
142	0319	Positano	63	14	Flower	Bruce	H	Not collected		
142	0320	Positano	63	14	Leaf	Bruce	H	Positive	14.97	
143	0321	Positano	62	16	Flower	Bruce	H	Weak positive	37.41	Negative
143	0322	Positano	62	16	Leaf	Bruce	H	Positive	14.1	
144	0323	Positano	63	17	Flower	Bruce	H	Positive		Positive
144	0324	Positano	63	17	Leaf	Bruce	H	Positive	14.16	
145	0325	Positano	62	19	Flower	Bruce	H	Positive	16.92	Positive
145	0326	Positano	62	19	Leaf	Bruce	H	Positive	12.94	
146	0327	Positano	63	20	Flower	Bruce	H	Positive	28.51	Negative
146	0328	Positano	63	20	Leaf	Bruce	H	Positive	12.71	
147	0329	Positano	62	22	Flower	Bruce	H	Positive	31.05	Negative
147	0330	Positano	62	22	Leaf	Bruce	H	Positive	12.74	
148	0331	Positano	63	23	Flower	Bruce	H	Positive	19.51	Positive
148	0332	Positano	63	23	Leaf	Bruce	H	Positive	13.99	
149	0333	Positano	64	24	Flower	Bruce	H	Positive	16.64	Positive
149	0334	Positano	64	24	Leaf	Bruce	H	Positive	13.07	
150	0335	Positano	64	21	Flower	Bruce	H	Positive	28.51	Negative
150	0336	Positano	64	21	Leaf	Bruce	H	Positive	14	
151	0337	Positano	66	23	Flower	Bruce	H	Positive	34.59	Negative

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151	0338	Positano	66	23	Leaf	Bruce	H	Positive	12.93	
152	0339	Positano	68	22	Flower	Bruce	H	Positive	27.2	Negative
152	0340	Positano	68	22	Leaf	Bruce	H	Positive	13.69	
153	0341	Positano	67	21	Flower	Bruce	H	Positive	31.73	Negative
153	0342	Positano	67	21	Leaf	Bruce	H	Positive	11.97	
154	0343	Positano	64	18	Flower	Bruce	H	Positive	31.79	Negative
154	0344	Positano	64	18	Leaf	Bruce	H	Positive	17.92	
155	0345	Positano	64	15	Flower	Bruce	H	Not collected		
155	0346	Positano	64	15	Leaf	Bruce	H	Positive	18.31	
156	0347	Positano	64	12	Flower	Bruce	H	Negative	42.52	Negative
156	0348	Positano	64	12	Leaf	Bruce	H	Positive	16.95	
157	0349	Positano	64	9	Flower	Bruce	H	Positive	18.58	Positive
157	0350	Positano	64	9	Leaf	Bruce	H	Positive	18.2	
158	0351	Positano	54	2	Flower	Bruce	H	Negative	0	Negative
158	0352	Positano	54	2	Leaf	Bruce	H	Positive	26.08	
159	0353	Positano	55	3	Flower	Bruce	H	Not collected		
159	0354	Positano	55	3	Leaf	Bruce	H	Positive	23.55	
160	0355	Positano	54	5	Flower	Bruce	H	Positive	31.97	Negative
160	0356	Positano	54	5	Leaf	Bruce	H	Positive	26.61	
161	0357	Positano	55	6	Flower	Bruce	H	Negative	0	Negative
161	0358	Positano	55	6	Leaf	Bruce	H	Positive	22.36	
162	0359	Positano	54	8	Flower	Bruce	H	Negative	0	Negative
162	0360	Positano	54	8	Leaf	Bruce	H	Negative	0/38.96	
163	0361	Positano	55	9	Flower	Bruce	H	Positive	34.76	Negative
163	0362	Positano	55	9	Leaf	Bruce	H	Positive	29.95	
164	0363	Positano	54	11	Flower	Bruce	H	Negative	0	Negative
164	0364	Positano	54	11	Leaf	Bruce	H	Negative	0	
165	0365	Positano	55	12	Flower	Bruce	H	Negative	0/42.28	Negative
165	0366	Positano	55	12	Leaf	Bruce	H	Weak positive	32.27	
166	0367	Positano	54	14	Flower	Bruce	H	Positive	33.72	Negative
166	0368	Positano	54	14	Leaf	Bruce	H	Positive	20.75	
167	0369	Positano	55	15	Flower	Bruce	H	Negative	0	Negative
167	0370	Positano	55	15	Leaf	Bruce	H	Positive	18.74	
168	0371	Positano	54	17	Flower	Bruce	H	Positive	33.75	Negative
168	0372	Positano	54	17	Leaf	Bruce	H	Weak positive	31.06	
169	0373	Positano	55	18	Flower	Bruce	H	Negative	0	Negative
169	0374	Positano	55	18	Leaf	Bruce	H	Positive	25.04	
170	0375	Positano	54	20	Flower	Bruce	H	Positive	33.86	Negative
170	0376	Positano	54	20	Leaf	Bruce	H	Negative	0	
171	0377	Positano	55	21	Flower	Bruce	H	Negative	0/40.44	Negative
171	0378	Positano	55	21	Leaf	Bruce	H	Weak positive	35	
172	0379	Positano	54	23	Flower	Bruce	H	Positive	28.9	Negative
172	0380	Positano	54	23	Leaf	Bruce	H	Positive	23.54	
173	0381	Positano	55	24	Flower	Bruce	H	Negative	0	Negative
173	0382	Positano	55	24	Leaf	Bruce	H	Negative	38.7	
174	0383	Positano	54	26	Flower	Bruce	H	Negative	0	Negative
174	0384	Positano	54	26	Leaf	Bruce	H	Weak positive	31.54	
175	0385	Positano	55	27	Flower	Bruce	H	Positive	32.13	Negative
175	0386	Positano	55	27	Leaf	Bruce	H	Negative	0/39.33	
176	0387	Positano	54	29	Flower	Bruce	H	Positive	26.26	Negative

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
176	0388	Positano	54	29	Leaf	Bruce	H	Positive	21.33	
177	0389	Positano	55	30	Flower	Bruce	H	Negative	0	Negative
177	0390	Positano	55	30	Leaf	Bruce	H	Positive	22.42	
178	0391	Positano	56	28	Flower	Bruce	H	Negative	0	Negative
178	0392	Positano	56	28	Leaf	Bruce	H	Positive	26.04	
179	0393	Positano	56	25	Flower	Bruce	H	Positive	28.25	Negative
179	0394	Positano	56	25	Leaf	Bruce	H	Weak positive	32.72	
180	0395	Positano	56	22	Flower	Bruce	H	Weak positive	35.34	Negative
180	0396	Positano	56	22	Leaf	Bruce	H	Negative	37.04	
181	0397	Positano	56	19	Flower	Bruce	H	Positive	31.41	Negative
181	0398	Positano	56	19	Leaf	Bruce	H	Weak positive	32.74	
182	0399	Positano	56	16	Flower	Bruce	H	Positive	27.67	Negative
182	0400	Positano	56	16	Leaf	Bruce	H	Weak positive	33.88	
183	0401	Venice	14	9	Flower	Bruce	H	Weak positive	35.37	Negative
183	0402	Venice	14	9	Leaf	Bruce	H	Positive	14.53	
184	0403	Venice	15	10	Flower	Bruce	H	Negative	0	Negative
184	0404	Venice	15	10	Leaf	Bruce	H	Positive	16.63	
185	0405	Venice	14	14	Flower	Bruce	H	Negative	0	Negative
185	0406	Venice	14	14	Leaf	Bruce	H	Positive	15.46	
186	0407	Venice	15	22	Flower	Bruce	H	Weak positive	37.08	Negative
186	0408	Venice	15	22	Leaf	Bruce	H	Positive	16.02	
187	0409	Venice	29	9	Flower	Bruce	H	Positive	30.74	Negative
187	0410	Venice	29	9	Leaf	Bruce	H	Positive	14.64	
188	0411	Napoli	49	35	Flower	Bruce	H	Negative	0	Negative
188	0412	Napoli	49	35	Leaf	Bruce	H	Positive	16.16	
189	0413	Napoli	51	15	Flower	Bruce	H	Weak positive	35.23	Negative
189	0414	Napoli	51	15	Leaf	Bruce	H	Positive	17.1	
190	0415	Napoli	52	15	Flower	Bruce	H	Positive	34.78	Negative
190	0416	Napoli	52	15	Leaf	Bruce	H	Positive	14.96	
191	0417	Napoli	4	15	Flower	Bruce	H	Weak positive	36.03	Negative
191	0418	Napoli	4	15	Leaf	Bruce	H	Positive	15.36	
192	0451	Positano	59	1	Leaf	Bruce	H	Positive	15.99	
192	0452	Positano	59	1	Flower	Bruce	H	Positive	34.99	Negative
193	0453	Positano	59	4	Leaf	Bruce	H	Positive	17.97	
193	0454	Positano	59	4	Flower	Bruce	H	Not collected		
194	0455	Positano	59	7	Leaf	Bruce	H	Positive	16.88	
194	0456	Positano	59	7	Flower	Bruce	H	Weak positive	35.04	Negative
195	0457	Positano	59	10	Leaf	Bruce	H	Positive	18.06	
195	0458	Positano	59	10	Flower	Bruce	H	Negative	0	Negative
196	0459	Positano	59	13	Leaf	Bruce	H	Positive	17.33	
196	0460	Positano	59	13	Flower	Bruce	H	Positive	32.64	Negative
197	0461	Positano	59	16	Leaf	Bruce	H	Positive	14.95	
197	0462	Positano	59	16	Flower	Bruce	H	Positive	32.52	Positive
198	0463	Positano	59	19	Leaf	Bruce	H	Positive	17.35	
198	0464	Positano	59	19	Flower	Bruce	H	Negative	0	Negative
199	0465	Positano	59	22	Leaf	Bruce	H	Positive	16.92	
199	0466	Positano	59	22	Flower	Bruce	H	Negative	0/45.38	Negative
200	0467	Positano	59	25	Leaf	Bruce	H	Positive	17.19	

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
200	0468	Positano	59	25	Flower	Bruce	H	Negative	0	Negative
201	0469	Positano	59	28	Leaf	Bruce	H	Positive	15.75	
201	0470	Positano	59	28	Flower	Bruce	H	Negative	0	Negative
202	0471	Positano	59	31	Leaf	Bruce	H	Positive	17	
202	0472	Positano	59	31	Flower	Bruce	H	Negative	0	Negative
203	0473	Positano	59	34	Leaf	Bruce	H	Positive	19.52	
203	0474	Positano	59	34	Flower	Bruce	H	Negative	0	Negative
204	0475	Positano	59	37	Leaf	Bruce	H	Positive	17.52	
204	0476	Positano	59	37	Flower	Bruce	H	weak positive	37.89	Negative
205	0477	Positano	58	36	Leaf	Bruce	H	Positive	17.82	
205	0478	Positano	58	36	Flower	Bruce	H	weak positive	36.06	Negative
206	0479	Positano	58	33	Leaf	Bruce	H	Positive	15.61	
206	0480	Positano	58	33	Flower	Bruce	H	Negative	0/47.44	Negative
207	0481	Positano	58	30	Leaf	Bruce	H	Positive	18.18	
207	0482	Positano	58	30	Flower	Bruce	H	Negative	0	Negative
208	0483	Positano	58	27	Leaf	Bruce	H	Positive	16.33	
208	0484	Positano	58	27	Flower	Bruce	H	Negative	0	Negative
209	0485	Positano	58	24	Leaf	Bruce	H	Positive	16.89	
209	0486	Positano	58	24	Flower	Bruce	H	Positive	31.26	Negative
210	0487	Positano	58	21	Leaf	Bruce	H	Positive	18.07	
210	0488	Positano	58	21	Flower	Bruce	H	Positive	24.5	Negative
211	0489	Positano	58	18	Leaf	Bruce	H	Positive	21.32	
211	0490	Positano	58	18	Flower	Bruce	H	Negative	0	Negative
212	0491	Positano	58	15	Leaf	Bruce	H	Positive	16.37	
212	0492	Positano	58	15	Flower	Bruce	H	Weak positive	36.18	Negative
213	0493	Positano	58	12	Leaf	Bruce	H	Positive	16.48	
213	0494	Positano	58	12	Flower	Bruce	H	Positive	30.24	Negative
214	0495	Positano	58	9	Leaf	Bruce	H	Positive	18.51	
214	0496	Positano	58	9	Flower	Bruce	H	Positive	32.81	Positive
215	0497	Positano	58	6	Leaf	Bruce	H	Positive	16	
215	0498	Positano	58	6	Flower	Bruce	H	Positive	23.49	Negative
216	0499	Positano	58	3	Leaf	Bruce	H	Positive	15.85	
216	0500	Positano	58	3	Flower	Bruce	H	Positive	27.98	Positive
217	0501	Positano	57	2	Leaf	Bruce	H	Positive	21.31	
217	0502	Positano	57	2	Flower	Bruce	H	Weak positive	35.76	Negative
218	0503	Positano	57	5	Leaf	Bruce	H	Positive	18.05	
218	0504	Positano	57	5	Flower	Bruce	H	Positive	31.46	Negative
219	0505	Positano	57	8	Leaf	Bruce	H	Positive	18.28	
219	0506	Positano	57	8	Flower	Bruce	H	Weak positive	35.17	Negative
220	0507	Napoli	59	6	Leaf	Bruce	H	Negative	0	
220	0508	Napoli	59	6	Flower	Bruce	H	Not collected		
221	0509	Napoli	59	9	Leaf	Bruce	H	Negative	0	
221	0510	Napoli	59	9	Flower	Bruce	H	Negative	0	Negative
222	0511	Napoli	59	12	Leaf	Bruce	H	Negative	0	
222	0512	Napoli	59	12	Flower	Bruce	H	Negative	0	Negative
223	0513	Napoli	59	15	Leaf	Bruce	H	Weak Positive	34.75	
223	0514	Napoli	59	15	Flower	Bruce	H	Negative	0	Negative
224	0515	Napoli	59	18	Leaf	Bruce	H	Negative	0	
224	0516	Napoli	59	18	Flower	Bruce	H	Positive	34.41	Negative

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
225	0517	Napoli	59	24	Leaf	Bruce	H	Negative	0	
225	0518	Napoli	59	24	Flower	Bruce	H	Negative	0	Negative
226	0519	Napoli	59	27	Leaf	Bruce	H	Negative	0	
226	0520	Napoli	59	27	Flower	Bruce	H	Negative	0	Negative
227	0521	Napoli	59	33	Leaf	Bruce	H	Negative	0	
227	0522	Napoli	59	33	Flower	Bruce	H	Negative	0	Negative
228	0523	Napoli	59	35	Leaf	Bruce	H	Not collected		
228	0524	Napoli	59	35	Flower	Bruce	H	Not collected		
229	0525	Napoli	58	34	Leaf	Bruce	H	Positive	26.53	
229	0526	Napoli	58	34	Flower	Bruce	H	Negative	0	Negative
230	0527	Napoli	60	4	Leaf	Bruce	H	Positive	22.69	
230	0528	Napoli	60	4	Flower	Bruce	H	Negative	0	Negative
231	0529	Napoli	60	7	Leaf	Bruce	H	Negative	35.15	
231	0530	Napoli	60	7	Flower	Bruce	H	Negative	0	Negative
232	0531	Napoli	60	10	Leaf	Bruce	H	Positive	23.48	
232	0532	Napoli	60	10	Flower	Bruce	H	Negative	0	Negative
233	0533	Napoli	60	13	Leaf	Bruce	H	Weak positive	32.53	
233	0534	Napoli	60	13	Flower	Bruce	H	Negative	0	Negative
234	0535	Napoli	60	16	Leaf	Bruce	H	Positive	25.77	
234	0536	Napoli	60	16	Flower	Bruce	H	Negative	0	Negative
235	0537	Napoli	60	19	Leaf	Bruce	H	Positive	20.14	
235	0538	Napoli	60	19	Flower	Bruce	H	Negative	0	Negative
236	0539	Napoli	60	22	Leaf	Bruce	H	Positive	21.5	
236	0540	Napoli	60	22	Flower	Bruce	H	Negative	0	Negative
237	0541	Napoli	60	25	Leaf	Bruce	H	Positive	23.12	
237	0542	Napoli	60	25	Flower	Bruce	H	Negative	0	Negative
238	0543	Napoli	60	28	Leaf	Bruce	H	Positive	27.35	
238	0544	Napoli	60	28	Flower	Bruce	H	Positive	28.32	Negative
239	0545	Napoli	60	31	Leaf	Bruce	H	Positive	25.54	
239	0546	Napoli	60	31	Flower	Bruce	H	Negative	0	Negative
240	0547	Napoli	60	34	Leaf	Bruce	H	Positive	22.58	
240	0548	Napoli	60	34	Flower	Bruce	H	Negative	0	Negative
241	0549	Napoli	60	37	Leaf	Bruce	H	Positive	19.9	
241	0550	Napoli	60	37	Flower	Bruce	H	Negative	0/46.95	Negative
242	0551	Napoli	60	40	Leaf	Bruce	H	Positive	18.99	
242	0552	Napoli	60	40	Flower	Bruce	H	Negative	0	Negative
243	0553	Napoli	60	43	Leaf	Bruce	H	Positive	21.5	
243	0554	Napoli	60	43	Flower	Bruce	H	Positive	33.99	Negative
244	0555	Napoli	61	26	Leaf	Bruce	H	Negative	0	
244	0556	Napoli	61	26	Flower	Bruce	H	Negative	0	Negative
245	0557	Napoli	61	20	Leaf	Bruce	H	Weak positive	30.56	
245	0558	Napoli	61	20	Flower	Bruce	H	Negative	0	Negative
246	0559	Venice	13	7	Leaf	Bruce	H	Positive	15.09	
246	0560	Venice	13	7	Flower	Bruce	H	Weak positive	35.65	Negative
247	0561	Venice	12	8	Leaf	Bruce	H	Positive	16.34	
247	0562	Venice	12	8	Flower	Bruce	H	Positive	28.46	Negative
248	0563	Venice	13	10	Leaf	Bruce	H	Positive	14.83	
248	0564	Venice	13	10	Flower	Bruce	H	Positive	27.15	Positive
249	0565	Venice	12	11	Leaf	Bruce	H	Positive	15.18	
249	0566	Venice	12	11	Flower	Bruce	H	Weak positive	35.88	Negative

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
250	0567	Venice	12	2	Leaf	Bruce	H	Positive	13.38	
250	0568	Venice	12	2	Flower	Bruce	H	Positive	25.6	Positive
251	0569	Venice	11	3	Leaf	Bruce	H	Positive	15.51	
251	0570	Venice	11	3	Flower	Bruce	H	Negative	0	Negative
252	0571	Venice	11	6	Leaf	Bruce	H	Positive	12.95	
252	0572	Venice	11	6	Flower	Bruce	H	Positive	26.2	Negative
253	0573	Venice	11	9	Leaf	Bruce	H	Positive	13.95	
253	0574	Venice	11	9	Flower	Bruce	H	Positive	34.39	Negative
254	0575	Venice	21	20	Leaf	Bruce	H	Positive	12.84	
254	0576	Venice	21	20	Flower	Bruce	H	Negative	0	Negative
255	0577	Venice	33	9	Leaf	Bruce	H	Positive	14.33	
255	0578	Venice	33	9	Flower	Bruce	H	Positive	34.87	Negative
256	0579	Venice	31	16	Leaf	Bruce	H	Positive	13.64	
256	0580	Venice	31	16	Flower	Bruce	H	Weak positive	35.45	Negative
257	0581	Venice	32	27	Leaf	Bruce	H	Positive	13.26	
257	0582	Venice	32	27	Flower	Bruce	H	Negative	0	Negative
258	0583	Venice	33	27	Leaf	Bruce	H	Positive	13.45	
258	0584	Venice	33	27	Flower	Bruce	H	Negative	0	Negative
259	0585	Venice	33	33	Leaf	Bruce	H	Positive	13.16	
259	0586	Venice	33	33	Flower	Bruce	H	Weak positive	36.45	Negative
260	0587	Venice	37	7	Leaf	Bruce	H	Positive	13.7	
260	0588	Venice	37	7	Flower	Bruce	H	Positive	34.89	Negative
261	0589	Venice	37	13	Leaf	Bruce	H	Positive	12.57	
261	0590	Venice	37	13	Flower	Bruce	H	Positive	29.16	Negative
262	0591	Venice	43	4	Leaf	Bruce	H	Positive	15.36	
262	0592	Venice	43	4	Flower	Bruce	H	Negative	0	Negative
263	0593	Venice	41	23	Leaf	Bruce	H	Positive	13.84	
263	0594	Venice	41	23	Flower	Bruce	H	Negative	0	Negative
264	0595	Venice	49	13	Leaf	Bruce	H	Negative	0	
264	0596	Venice	49	13	Flower	Bruce	H	Weak positive	36.17	Negative
265	0597	Venice	48	11	Leaf	Bruce	H	Positive	13.3	
265	0598	Venice	48	11	Flower	Bruce	H	Negative	0	Negative
266	0599	Venice	47	2?	Leaf	Bruce	H	Positive	13.88	
266	0600	Venice	47	2?	Flower	Bruce	H	Positive	32.07	Negative
267	0601	Napoli	53	15	Flower	Bruce	H	Positive	33.39	Negative
267	0602	Napoli	53	15	Leaf	Bruce	H	Weak positive	30.49	
268	0603	Napoli	51		Flower	Bruce	H	Negative	0	Negative
268	0604	Napoli	51		Leaf	Bruce	H	Positive	17.15	
269	0605	Napoli	52		Flower	Bruce	H	Positive	32.75	Negative
269	0606	Napoli	52		Leaf	Bruce	H	Positive	22.97	
270	0607	Napoli	53		Flower	Bruce	H	Positive	28.14	Positive
270	0608	Napoli	53		Leaf	Bruce	H	Positive	27.13	
271	0609	Napoli	51		Flower	Bruce	H	Weak positive	41.3	Negative
271	0610	Napoli	51		Leaf	Bruce	H	Positive	23.57	
272	0611	Napoli	52		Flower	Bruce	H	Positive	28.19	Negative
272	0612	Napoli	52		Leaf	Bruce	H	Negative	0	
273	0613	Napoli	53		Flower	Bruce	H	Weak positive	36.31	Negative
273	0614	Napoli	53		Leaf	Bruce	H	Positive	20.67	
274	0615	Napoli	51		Flower	Bruce	H	Positive	33.26	Negative

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
274	0616	Napoli	51		Leaf	Bruce	H	Weak positive	32.98	
275	0617	Napoli	52		Flower	Bruce	H	Positive	30.05	Negative
275	0618	Napoli	52		Leaf	Bruce	H	Positive	18.7	
276	0619	Napoli	53		Flower	Bruce	H	Negative	0	Negative
276	0620	Napoli	53		Leaf	Bruce	H	Weak positive	30.76	
277	0621	Napoli	51		Flower	Bruce	H	Negative	0	Negative
277	0622	Napoli	51		Leaf	Bruce	H	Weak positive	34.13	
278	0623	Napoli	52		Flower	Bruce	H	Weak positive	37.12	Negative
278	0624	Napoli	52		Leaf	Bruce	H	Weak positive	32.26	
279	0625	Napoli	51		Flower	Bruce	H	Positive	31.07	Positive
279	0626	Napoli	51		Leaf	Bruce	H	Positive	25.74	
280	0627	Napoli	53		Flower	Bruce	H	Negative	0	Negative
280	0628	Napoli	53		Leaf	Bruce	H	Negative	0	
281	0629	Napoli	51		Flower	Bruce	H	Positive	34.28	Negative
281	0630	Napoli	51		Leaf	Bruce	H	Negative	0/47.22	
282	0631	Napoli	52		Flower	Bruce	H	Negative	0	Negative
282	0632	Napoli	52		Leaf	Bruce	H	Negative	0/45.45	
283	0633	Napoli	53		Flower	Bruce	H	Positive	30.94	Negative
283	0634	Napoli	53		Leaf	Bruce	H	Positive	17.92	
284	0635	Napoli	51		Flower	Bruce	H	Weak positive	35.1	Negative
284	0636	Napoli	51		Leaf	Bruce	H	Positive	18.19	
285	0637	Napoli	52		Flower	Bruce	H	Positive	33.67	Positive
285	0638	Napoli	52		Leaf	Bruce	H	Negative	0	
286	0639	Napoli	53		Flower	Bruce	H	Negative	0	Negative
286	0640	Napoli	53		Leaf	Bruce	H	Negative	0	
287	0641	Napoli	55		Flower	Bruce	H	Negative	0	Negative
287	0642	Napoli	55		Leaf	Bruce	H	Negative	0	
288	0643	Napoli	56		Flower	Bruce	H	Positive	26.74	Negative
288	0644	Napoli	56		Leaf	Bruce	H	Positive	28.53	
289	0651	Latina	74	1	Leaf	Bruce	L	Positive	13.18	
289	0652	Latina	74	1	Flower	Bruce	L	Weak positive	35.61	Negative
290	0653	Latina	75	2	Flower	Bruce	L	Negative	0	Negative
290	0654	Latina	75	2	Leaf	Bruce	L	Negative	38.09	
291	0655	Latina	76	3	Flower	Bruce	L	Negative	0	Negative
291	0656	Latina	76	3	Leaf	Bruce	L	Negative	0	
292	0657	Latina	74	4	Flower	Bruce	L	Negative	0	Negative
292	0658	Latina	74	4	Leaf	Bruce	L	Positive	21.45	
293	0659	Latina	75	5	Flower	Bruce	L	Positive	26	Negative
293	0660	Latina	75	5	Leaf	Bruce	L	Negative	0	
294	0661	Latina	76	6	Flower	Bruce	L	Negative	0/44.18	Negative
294	0662	Latina	76	6	Leaf	Bruce	L	Negative	0	
295	0663	Latina	74	7	Flower	Bruce	L	Negative	0	Negative
295	0664	Latina	74	7	Leaf	Bruce	L	Positive	27.92	
296	0665	Latina	75	8	Flower	Bruce	L	Negative	0	Negative
296	0666	Latina	75	8	Leaf	Bruce	L	Positive	28.12	
297	0667	Latina	76	9	Flower	Bruce	L	Negative	0	Negative
297	0668	Latina	76	9	Leaf	Bruce	L	Positive	28.81	
298	0669	Latina	74	10	Flower	Bruce	L	Negative	0	Negative
298	0670	Latina	74	10	Leaf	Bruce	L	Weak Positive	32.68	

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299	0671	Latina	75	11	Flower	Bruce	L	Negative	0	Negative
299	0672	Latina	75	11	Leaf	Bruce	L	Weak Positive	33.32	
300	0673	Latina	76	12	Flower	Bruce	L	Positive	31.69	Negative
300	0674	Latina	76	12	Leaf	Bruce	L	Negative	0	
301	0675	Latina	74	13	Flower	Bruce	L	Positive	27.44	Negative
301	0676	Latina	74	13	Leaf	Bruce	L	Weak Positive	32.19	
302	0677	Latina	75	14	Flower	Bruce	L	Positive	28.17	Negative
302	0678	Latina	75	14	Leaf	Bruce	L	Positive	24.26	
303	0679	Latina	76	15	Flower	Bruce	L	Negative	0	Negative
303	0680	Latina	76	15	Leaf	Bruce	L	Negative	0	
304	0681	Latina	74	16	Flower	Bruce	L	Negative	0	Negative
304	0682	Latina	74	16	Leaf	Bruce	L	Negative	0	
305	0683	Latina	75	17	Flower	Bruce	L	Positive	34.64	Negative
305	0684	Latina	75	17	Leaf	Bruce	L	Negative	0	
306	0685	Latina	76	18	Flower	Bruce	L	Positive	34.07	Negative
306	0686	Latina	76	18	Leaf	Bruce	L	Positive	25.13	
307	0687	Latina	74	19	Flower	Bruce	L	Negative	0	Negative
307	0688	Latina	74	19	Leaf	Bruce	L	Negative	0	
308	0689	Latina	75	20	Flower	Bruce	L	Negative	0	Negative
308	0690	Latina	75	20	Leaf	Bruce	L	Negative	0	
309	0691	Latina	76	21	Flower	Bruce	L	Positive	34.82	Positive
309	0692	Latina	76	21	Leaf	Bruce	L	Negative	35.3	
310	0693	Latina	74	22	Flower	Bruce	L	Negative	0	Negative
310	0694	Latina	74	22	Leaf	Bruce	L	Negative	0	
311	0695	Latina	75	23	Flower	Bruce	L	Negative	0	Negative
311	0696	Latina	75	23	Leaf	Bruce	L	Negative	0	
312	0697	Latina	76	24	Flower	Bruce	L	Positive	27.4	Negative
312	0698	Latina	76	24	Leaf	Bruce	L	Weak positive	34.54	
313	0699	Latina	74	25	Flower	Bruce	L	Negative	0	Negative
313	0700	Latina	74	25	Leaf	Bruce	L	Negative	0	
314	0701	Latina	19	1	Flower	Bruce	L	Negative	0	Negative
314	0702	Latina	19	1	Leaf	Bruce	L	Negative	0	
315	0703	Latina	20	2	Flower	Bruce	L	Negative	0/40.13	Negative
315	0704	Latina	20	2	Leaf	Bruce	L	Positive	23.45	
316	0705	Latina	18	3	Flower	Bruce	L	Negative	0	Negative
316	0706	Latina	18	3	Leaf	Bruce	L	Positive	23.87	
317	0707	Latina	19	4	Flower	Bruce	L	Negative	0	Negative
317	0708	Latina	19	4	Leaf	Bruce	L	Negative	0	
318	0709	Latina	20	5	Flower	Bruce	L	Negative	0	Negative
318	0710	Latina	20	5	Leaf	Bruce	L	Negative	0/47.1	
319	0711	Latina	18	6	Flower	Bruce	L	Negative	0	Negative
319	0712	Latina	18	6	Leaf	Bruce	L	Negative	38.15	
320	0713	Latina	19	7	Flower	Bruce	L	Negative	0/48.03	Negative
320	0714	Latina	19	7	Leaf	Bruce	L	Positive	24.88	
321	0715	Latina	20	8	Flower	Bruce	L	Negative	0	Negative
321	0716	Latina	20	8	Leaf	Bruce	L	Negative	0	
322	0717	Latina	18	9	Flower	Bruce	L	Not collected		
322	0718	Latina	18	9	Leaf	Bruce	L	Positive	22.93	
323	0719	Latina	19	10	Flower	Bruce	L	Negative	0	Negative
323	0720	Latina	19	10	Leaf	Bruce	L	Negative	41.2	
324	0721	Latina	20	11	Flower	Bruce	L	Negative	0	Negative

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
324	0722	Latina	20	11	Leaf	Bruce	L	Negative	0	
325	0723	Latina	18	12	Flower	Bruce	L	Negative	0	Negative
325	0724	Latina	18	12	Leaf	Bruce	L	Positive	20.86	
326	0725	Latina	19	13	Flower	Bruce	L	Negative	0	Negative
326	0726	Latina	19	13	Leaf	Bruce	L	Negative	0	
327	0727	Latina	20	14	Flower	Bruce	L	Negative	0	Negative
327	0728	Latina	20	14	Leaf	Bruce	L	Positive	21.4	
328	0729	Latina	18	15	Flower	Bruce	L	Negative	0	Positive
328	0730	Latina	18	15	Leaf	Bruce	L	Positive	22.4	
329	0731	Latina	19	16	Flower	Bruce	L	Positive	31.71	Negative
329	0732	Latina	19	16	Leaf	Bruce	L	Positive	20.95	
330	0733	Latina	20	17	Flower	Bruce	L	Not collected		
330	0734	Latina	20	17	Leaf	Bruce	L	Positive	21.87	
331	0735	Latina	18	18	Flower	Bruce	L	Negative	0	Negative
331	0736	Latina	18	18	Leaf	Bruce	L	Positive	24.42	
332	0737	Latina	19	19	Flower	Bruce	L	Not collected		
332	0738	Latina	19	19	Leaf	Bruce	L	Positive	20.74	
333	0739	Latina	20	20	Flower	Bruce	L	Negative	0	Negative
333	0740	Latina	20	20	Leaf	Bruce	L	Positive	24.16	
334	0741	Latina	18	21	Flower	Bruce	L	Negative	0/43.80	Negative
334	0742	Latina	18	21	Leaf	Bruce	L	Negative	0	
335	0743	Latina	19	22	Flower	Bruce	L	Negative	0	Negative
335	0744	Latina	19	22	Leaf	Bruce	L	Positive	22.19	
336	0745	Latina	20	23	Flower	Bruce	L	Negative	0	Negative
336	0746	Latina	20	23	Leaf	Bruce	L	Positive	24.14	
337	0747	Latina	18	24	Flower	Bruce	L	Weak positive	35.91	Negative
337	0748	Latina	18	24	Leaf	Bruce	L	Positive	26.29	
338	0749	Latina	19	25	Flower	Bruce	L	Positive	33.14	Negative
338	0750	Latina	19	25	Leaf	Bruce	L	Negative	0	
339	0751	Latina	78	2	Flower	Bruce	L	Negative	0	Negative
339	0752	Latina	78	2	Leaf	Bruce	L	Positive	25.95	
340	0753	Latina	80	1	Leaf	Bruce	L	Positive	23.38	
340	0754	Latina	80	1	Flower	Bruce	L	Negative	0	Negative
341	0755	Latina	79	3	Flower	Bruce	L	Negative	0	Negative
341	0756	Latina	79	3	Leaf	Bruce	L	Negative	0	
342	0757	Latina	80	4	Flower	Bruce	L	Negative	0	Negative
342	0758	Latina	80	4	Leaf	Bruce	L	Weak positive	34.51	
343	0759	Latina	79	6	Flower	Bruce	L	Negative	0/40.41	Negative
343	0760	Latina	79	6	Leaf	Bruce	L	Negative	0	
344	0761	Latina	78	8	Flower	Bruce	L	Negative	0	Negative
344	0762	Latina	78	8	Leaf	Bruce	L	Negative	0/38.34	
345	0763	Latina	79	9	Flower	Bruce	L	Weak positive	35.05	Negative
345	0764	Latina	79	9	Leaf	Bruce	L	Weak positive	32.37	
346	0765	Latina	71	1	Flower	Bruce	L	Negative	0	Negative
346	0766	Latina	71	1	Leaf	Bruce	L	Negative	0	
347	0767	Latina	72	2	Flower	Bruce	L	Negative	0/49.32	Negative
347	0768	Latina	72	2	Leaf	Bruce	L	Negative	35.29	
348	0769	Latina	71	4	Flower	Bruce	L	Negative	0	Negative
348	0770	Latina	71	4	Leaf	Bruce	L	Positive	23.44	
349	0771	Latina	72	5	Flower	Bruce	L	Negative	0	Negative

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
349	0772	Latina	72	5	Leaf	Bruce	L	Negative	0	
350	0773	Latina	70	6	Flower	Bruce	L	Negative	45.8	Negative
350	0774	Latina	70	6	Leaf	Bruce	L	Positive	23.71	
351	0775	Latina	71	7	Flower	Bruce	L	Negative	0	Negative
351	0776	Latina	71	7	Leaf	Bruce	L	Negative	0	
352	0777	Latina	72	8	Flower	Bruce	L	Negative	0	Negative
352	0778	Latina	72	8	Leaf	Bruce	L	Negative	0	
353	0779	Latina	70	9	Flower	Bruce	L	Negative	0	Negative
353	0780	Latina	70	9	Leaf	Bruce	L	Positive	22.57	
354	0781	Latina	71	10	Flower	Bruce	L	Negative	0	Negative
354	0782	Latina	71	10	Leaf	Bruce	L	Negative	0	
355	0783	Latina	72	11	Flower	Bruce	L	Negative	0	Negative
355	0784	Latina	72	11	Leaf	Bruce	L	Negative	43.83	
356	0785	Latina	70	12	Flower	Bruce	L	Negative	0	Positive
356	0786	Latina	70	12	Leaf	Bruce	L	Negative	0	
357	0787	Latina	71	13	Flower	Bruce	L	Negative	0	Negative
357	0788	Latina	71	13	Leaf	Bruce	L	Negative	0	
358	0789	Latina	72	14	Flower	Bruce	L	Negative	0	Negative
358	0790	Latina	72	14	Leaf	Bruce	L	Negative	0	
359	0791	Latina	70	15	Flower	Bruce	L	Positive	29.46	Positive
359	0792	Latina	70	15	Leaf	Bruce	L	Positive	25.24	
360	0793	Latina	71	16	Flower	Bruce	L	Positive	32.87	Negative
360	0794	Latina	71	16	Leaf	Bruce	L	Negative	0	
361	0795	Latina	72	17	Flower	Bruce	L	Positive	33.1	Negative
361	0796	Latina	72	17	Leaf	Bruce	L	Positive	24.43	
362	0797	Latina	70	18	Flower	Bruce	L	Negative	0	Negative
362	0798	Latina	70	18	Leaf	Bruce	L	Negative	0	
363	0799	Latina	72	20	Flower	Bruce	L	Negative	0	Negative
363	0800	Latina	72	20	Leaf	Bruce	L	Negative	0	
364	0801	Latina	10	1	Flower	Bruce	L	Negative	0	Negative
364	0802	Latina	10	1	Leaf	Bruce	L	Negative	0	
365	0803	Latina	12	2	Flower	Bruce	L	Negative	0	Negative
365	0804	Latina	12	2	Leaf	Bruce	L	Negative	0	
366	0805	Latina	12	3	Flower	Bruce	L	Negative	0	Negative
366	0806	Latina	12	3	Leaf	Bruce	L	Negative	0	
367	0807	Latina	10	4	Flower	Bruce	L	Negative	0	Negative
367	0808	Latina	10	4	Leaf	Bruce	L	Negative	0	
368	0809	Latina	11	5	Flower	Bruce	L	Negative	0	Negative
368	0810	Latina	11	5	Leaf	Bruce	L	Negative	0	
369	0811	Latina	11	8	Flower	Bruce	L	Negative	0	Negative
369	0812	Latina	11	8	Leaf	Bruce	L	Negative	0/37.59	
370	0813	Latina	12	9	Flower	Bruce	L	Negative	0	Negative
370	0814	Latina	12	9	Leaf	Bruce	L	Negative	0/37.12	
371	0815	Latina	10	10	Flower	Bruce	L	Negative	0/47.12	Negative
371	0816	Latina	10	10	Leaf	Bruce	L	Negative	0	
372	0817	Latina	11	11	Flower	Bruce	L	Positive	34	Negative
372	0818	Latina	11	11	Leaf	Bruce	L	Negative	0	
373	0819	Latina	12	12	Flower	Bruce	L	Negative	0	Negative
373	0820	Latina	12	12	Leaf	Bruce	L	Weak positive	34.61	
374	0821	Latina	10	13	Flower	Bruce	L	Negative	0	Negative
374	0822	Latina	10	13	Leaf	Bruce	L	Negative	36.9	
375	0823	Latina	11	14	Flower	Bruce	L	Negative	0	Negative

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
375	0824	Latina	11	14	Leaf	Bruce	L	Positive	25.27	
376	0825	Latina	12	15	Flower	Bruce	L	Negative	0	Negative
376	0826	Latina	12	15	Leaf	Bruce	L	Negative	0	
377	0827	Latina	10	16	Flower	Bruce	L	Negative	0	Negative
377	0828	Latina	10	16	Leaf	Bruce	L	Positive	23.33	
378	0829	Latina	11	17	Flower	Bruce	L	Negative	0	Negative
378	0830	Latina	11	17	Leaf	Bruce	L	Positive	23.11	
379	0831	Latina	12	18	Flower	Bruce	L	Negative	0	Negative
379	0832	Latina	12	18	Leaf	Bruce	L	Negative	0/38.64	
380	0833	Latina	11	20	Flower	Bruce	L	Negative	0	Negative
380	0834	Latina	11	20	Leaf	Bruce	L	Positive	21.97	
381	0835	Latina	12	21	Flower	Bruce	L	Negative	0/47.41	Negative
381	0836	Latina	12	21	Leaf	Bruce	L	Positive	18.84	
382	0837	Latina	10	22	Flower	Bruce	L	Negative	0	Negative
382	0838	Latina	10	22	Leaf	Bruce	L	Negative	0	
383	0839	Latina	12	24	Flower	Bruce	L	Negative	0	Negative
383	0840	Latina	12	24	Leaf	Bruce	L	Positive	22.65	
384	0841	Latina	10	25	Flower	Bruce	L	Weak positive	35.13	Negative
384	0842	Latina	10	25	Leaf	Bruce	L	Positive	21.12	
385	0843	Latina	12	27	Flower	Bruce	L	Positive	29.43	Positive
385	0844	Latina	12	27	Leaf	Bruce	L	Positive	25.51	
386	0845	Latina	11	29	Flower	Bruce	L	Negative	0	Negative
386	0846	Latina	11	29	Leaf	Bruce	L	Positive	22.29	
387	0847	Latina	12	30	Flower	Bruce	L	Negative	0	Negative
387	0848	Latina	12	30	Leaf	Bruce	L	Weak positive	32.82	
388	0849	Latina	10	31	Flower	Bruce	L	Negative	0	Negative
388	0850	Latina	10	31	Leaf	Bruce	L	Positive	27.2	
389	0851	JM-South	8	1	Flower	Ck3	L	Negative	0	Positive
389	0852	JM-South	8	1	Leaf	Ck3	L	Negative	0	
390	0853	JM-South	8	3	Flower	Ck3	L	Negative	0/48.05	Negative
390	0854	JM-South	8	3	Leaf	Ck3	L	Negative	0	
391	0855	JM-South	8	5	Flower	Ck3	L	Positive	34.17	Negative
391	0856	JM-South	8	5	Leaf	Ck3	L	Negative	0	
392	0857	JM-South	8	7	Flower	Ck3	L	Negative	0	Negative
392	0858	JM-South	8	7	Leaf	Ck3	L	Negative	0	
393	0859	JM-South	8	9	Flower	Ck3	L	Weak positive	36.39	Negative
393	0860	JM-South	8	9	Leaf	Ck3	L	Negative	0	
394	0861	JM-South	8	11	Flower	Ck3	L	Negative	0	Negative
394	0862	JM-South	8	11	Leaf	Ck3	L	Negative	0	
395	0863	JM-South	8	13	Flower	Ck3	L	Negative	0	Negative
395	0864	JM-South	8	13	Leaf	Ck3	L	Negative	0	
396	0865	JM-South	8	15	Flower	Ck3	L	Negative	0	Negative
396	0866	JM-South	8	15	Leaf	Ck3	L	Negative	0	
397	0867	JM-South	8	17	Flower	Ck3	L	negative	0	Negative
397	0868	JM-South	8	17	Leaf	Ck3	L	Negative	0	
398	0869	JM-South	8	19	Flower	Ck3	L	Negative	0	Negative
398	0870	JM-South	8	19	Leaf	Ck3	L	Negative	0	
399	0871	JM-South	8	21	Flower	Ck3	L	Weak positive	35.44	Negative
399	0872	JM-South	8	21	Leaf	Ck3	L	Negative	0	
400	0873	JM-South	6	23	Flower	Ck3	L	Negative	0	Negative
400	0874	JM-South	6	23	Leaf	Ck3	L	Negative	0	

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
401	0875	JM-South	6	21	Flower	Ck3	L	Negative	0/44.61	Negative
401	0876	JM-South	6	21	Leaf	Ck3	L	Negative	0	
402	0877	JM-South	6	19	Flower	Ck3	L	Negative	0	Negative
402	0878	JM-South	6	19	Leaf	Ck3	L	Negative	0	
403	0879	JM-South	6	17	Flower	Ck3	L	Negative	0	Negative
403	0880	JM-South	6	17	Leaf	Ck3	L	Negative	0	
404	0881	JM-South	6	15	Flower	Ck3	L	Negative	0	Negative
404	0882	JM-South	6	15	Leaf	Ck3	L	Negative	0	
405	0883	JM-South	6	13	Flower	Ck3	L	positive	34.14	Negative
405	0884	JM-South	6	13	Leaf	Ck3	L	Negative	0	
406	0885	JM-South	6	11	Flower	Ck3	L	positive	33.32	Negative
406	0886	JM-South	6	11	Leaf	Ck3	L	Negative	0	
407	0887	JM-South	6	9	Flower	Ck3	L	Weak positive	35.18	Negative
407	0888	JM-South	6	9	Leaf	Ck3	L	Negative	0	
408	0889	JM-South	6	7	Flower	Ck3	L	Negative	0	Negative
408	0890	JM-South	6	7	Leaf	Ck3	L	Negative	0	
409	0891	JM-South	6	3	Flower	Ck3	L	Negative	0	Negative
409	0892	JM-South	6	3	Leaf	Ck3	L	Negative	0	
410	0893	JM-South	4	3	Flower	Ck3	L	Negative	0	Negative
410	0894	JM-South	4	3	Leaf	Ck3	L	Negative	0	
411	0895	JM-South	4	5	Flower	Ck3	L	Negative	0	Negative
411	0896	JM-South	4	5	Leaf	Ck3	L	Negative	0	
412	0897	JM-South	4	7	Flower	Ck3	L	Negative	0	Negative
412	0898	JM-South	4	7	Leaf	Ck3	L	Negative	0	
413	0899	JM-South	4	9	Flower	Ck3	L	Negative	0	Negative
413	0900	JM-South	4	9	Leaf	Ck3	L	Negative	0	
414	0901	JM-South	10	1	Flower	Ck3	L	Negative	0	Negative
414	0902	JM-South	10	1	Leaf	Ck3	L	Negative	0	
415	0903	JM-South	10	3	Flower	Ck3	L	Negative	0	Negative
415	0904	JM-South	10	3	Leaf	Ck3	L	Negative	0	
416	0905	JM-South	10	5	Flower	Ck3	L	Negative	0/43.75	Negative
416	0906	JM-South	10	5	Leaf	Ck3	L	Negative	0	
417	0907	JM-South	10	7	Flower	Ck3	L	Negative	0	Negative
417	0908	JM-South	10	7	Leaf	Ck3	L	Negative	0	
418	0909	JM-South	10	9	Flower	Ck3	L	Negative	0	Negative
418	0910	JM-South	10	9	Leaf	Ck3	L	Negative	0	
419	0911	JM-South	10	11	Flower	Ck3	L	Negative	0	Negative
419	0912	JM-South	10	11	Leaf	Ck3	L	Negative	0/39.01	
420	0913	JM-South	10	13	Flower	Ck2	L	Negative	0	Negative
420	0914	JM-South	10	13	Leaf	Ck2	L	Negative	0	
421	0915	JM-South	10	15	Flower	Ck2	L	Negative	0	Negative
421	0916	JM-South	10	15	Leaf	Ck2	L	Negative	0	
422	0917	JM-South	10	17	Flower	Ck2	L	Negative	0/47.64	Negative
422	0918	JM-South	10	17	Leaf	Ck2	L	Negative	0	
423	0919	JM-South	10	19	Flower	Ck2	L	Negative	0/47.41	Negative
423	0920	JM-South	10	19	Leaf	Ck2	L	Negative	0	
424	0921	JM-South	10	21	Flower	Ck2	L	Negative	0	Negative
424	0922	JM-South	10	21	Leaf	Ck2	L	Negative	0/39.52	
425	0923	JM-South	15	21	Flower	Ck2	L	Negative	0	Negative
425	0924	JM-South	15	21	Leaf	Ck2	L	Negative	0	
426	0925	JM-South	15	19	Flower	Ck2	L	Negative	0/43.76	Negative
426	0926	JM-South	15	19	Leaf	Ck2	L	Negative	0	

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
427	0927	JM-South	15	17	Flower	Bruce	L	Negative	0/47.64	Negative
427	0928	JM-South	15	17	Leaf	Bruce	L	Negative	0	
428	0929	JM-South	15	15	Flower	Bruce	L	Negative	0	Negative
428	0930	JM-South	15	15	Leaf	Bruce	L	Negative	0	
429	0931	JM-South	15	13	Flower	Bruce	L	Negative	0	Negative
429	0932	JM-South	15	13	Leaf	Bruce	L	Negative	0	
430	0933	JM-South	15	11	Flower	Bruce	L	Negative	0	Negative
430	0934	JM-South	15	11	Leaf	Bruce	L	Negative	0	
431	0935	JM-South	15	9	Flower	Bruce	L	Negative	0/45.15	Negative
431	0936	JM-South	15	9	Leaf	Bruce	L	Negative	0	
432	0937	JM-South	15	7	Flower	Bruce	L	Negative	0	Negative
432	0938	JM-South	15	7	Leaf	Bruce	L	Negative	0	
433	0939	JM-South	15	5	Flower	Bruce	L	Negative	0	Negative
433	0940	JM-South	15	5	Leaf	Bruce	L	Negative	0	
434	0941	JM-South	17	7	Flower	Bruce	L	Negative	0	Negative
434	0942	JM-South	17	7	Leaf	Bruce	L	Negative	0	
435	0943	JM-South	17	9	Flower	Bruce	L	Negative	0	Negative
435	0944	JM-South	17	9	Leaf	Bruce	L	Negative	0	
436	0945	JM-South	17	11	Flower	Bruce	L	Negative	0	Negative
436	0946	JM-South	17	11	Leaf	Bruce	L	Negative	0	
437	0947	JM-South	17	13	Flower	Bruce	L	Negative	0	Negative
437	0948	JM-South	17	13	Leaf	Bruce	L	Negative	0	
438	0949	JM-South	17	15	Flower	Bruce	L	Negative	0	Negative
438	0950	JM-South	17	15	Leaf	Bruce	L	Negative	0	
439	0951	JM-South	36	1	Flower	Bruce	L	Negative	0	Negative
439	0952	JM-South	36	1	Leaf	Bruce	L	Negative	0	
440	0953	JM-South	36	3	Flower	Bruce	L	Negative	0/46.83	Negative
440	0954	JM-South	36	3	Leaf	Bruce	L	Negative	0	
441	0955	JM-South	36	5	Flower	Bruce	L	Negative	0	Negative
441	0956	JM-South	36	5	Leaf	Bruce	L	Negative	0	
442	0957	JM-South	36	7	Flower	Bruce	L	Negative	0	Negative
442	0958	JM-South	36	7	Leaf	Bruce	L	Negative	0	
443	0959	JM-South	36	9	Flower	Bruce	L	Negative	0	Negative
443	0960	JM-South	36	9	Leaf	Bruce	L	Negative	0	
444	0961	JM-South	36	11	Flower	Bruce	L	Negative	0/46.66	Negative
444	0962	JM-South	36	11	Leaf	Bruce	L	Negative	0	
445	0963	JM-South	36	13	Flower	Bruce	L	Negative	0	Negative
445	0964	JM-South	36	13	Leaf	Bruce	L	Negative	0	
446	0965	JM-South	36	15	Flower	Bruce	L	Weak positive	36.18	Negative
446	0966	JM-South	36	15	Leaf	Bruce	L	Negative	0	
447	0967	JM-South	36	17	Flower	Bruce	L	Negative	0	Negative
447	0968	JM-South	36	17	Leaf	Bruce	L	Negative	0	
448	0969	JM-South	36	19	Flower	Bruce	L	Negative	0	Negative
448	0970	JM-South	36	19	Leaf	Bruce	L	Negative	0	
449	0971	JM-South	36	21	Flower	Bruce	L	Negative	0	Negative
449	0972	JM-South	36	21	Leaf	Bruce	L	Negative	0	
450	0973	JM-South	36	23	Flower	Bruce	L	Negative	0	Negative
450	0974	JM-South	36	23	Leaf	Bruce	L	Negative	0	
451	0975	JM-South	36	25	Flower	Bruce	L	Negative	45.55	Negative
451	0976	JM-South	36	25	Leaf	Bruce	L	Negative	0	
452	0977	JM-South	34	25	Flower	Bruce	L	Negative	0	Negative
452	0978	JM-South	34	25	Leaf	Bruce	L	Negative	0	

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
453	0979	JM-South	34	23	Flower	Bruce	L	Negative	0	Negative
453	0980	JM-South	34	23	Leaf	Bruce	L	Negative	0	
454	0981	JM-South	34	21	Flower	Bruce	L	Negative	0	Negative
454	0982	JM-South	34	21	Leaf	Bruce	L	Negative	0	
455	0983	JM-South	34	19	Flower	Bruce	L	Negative	0	Negative
455	0984	JM-South	34	19	Leaf	Bruce	L	Negative	38.66	
456	0985	JM-South	34	17	Flower	Bruce	L	Positive	34.89	Negative
456	0986	JM-South	34	17	Leaf	Bruce	L	Negative	0	
457	0987	JM-South	34	15	Flower	Bruce	L	Negative	0	Negative
457	0988	JM-South	34	15	Leaf	Bruce	L	Negative	0	
458	0989	JM-South	34	13	Flower	Bruce	L	Negative	0	Negative
458	0990	JM-South	34	13	Leaf	Bruce	L	Negative	0	
459	0991	JM-South	34	11	Flower	Bruce	L	Negative	0/48.57	Negative
459	0992	JM-South	34	11	Leaf	Bruce	L	Negative	35.31	
460	0993	JM-South	34	9	Flower	Bruce	L	Positive	32.31	Negative
460	0994	JM-South	34	9	Leaf	Bruce	L	Negative	0	
461	0995	JM-South	34	7	Flower	Bruce	L	Negative	0	Negative
461	0996	JM-South	34	7	Leaf	Bruce	L	Negative	0	
462	0997	JM-South	34	5	Flower	Bruce	L	Positive	32.72	Negative
462	0998	JM-South	34	5	Leaf	Bruce	L	Negative	35.03	
463	0999	JM-South	34	3	Flower	Bruce	L	Negative	0/49.46	Negative
463	1000	JM-South	34	3	Leaf	Bruce	L	Negative	0	
464	1001	JM-South	32	1	Flower	Bruce	L	Negative	0/48.35	Negative
464	1002	JM-South	32	1	Leaf	Bruce	L	Negative	47.88	
465	1003	JM-South	32	3	Flower	Bruce	L	Negative	0	Negative
465	1004	JM-South	32	3	Leaf	Bruce	L	Negative	0	
466	1005	JM-South	32	5	Flower	Bruce	L	Negative	0/48.54	Negative
466	1006	JM-South	32	5	Leaf	Bruce	L	Negative	0	
467	1007	JM-South	32	7	Flower	Bruce	L	Not collected		
467	1008	JM-South	32	7	Leaf	Bruce	L	Negative	0	
468	1009	JM-South	32	9	Flower	Bruce	L	Negative	0	Negative
468	1010	JM-South	32	9	Leaf	Bruce	L	Negative	0	
469	1011	JM-South	32	11	Flower	Bruce	L	Not collected		
469	1012	JM-South	32	11	Leaf	Bruce	L	Negative	0	
470	1013	JM-South	32	13	Flower	Bruce	L	Negative	0	Negative
470	1014	JM-South	32	13	Leaf	Bruce	L	Negative	0	
471	1015	JM-South	32	15	Flower	Bruce	L	Negative	0	Negative
471	1016	JM-South	32	15	Leaf	Bruce	L	Negative	0	
472	1017	JM-South	32	17	Flower	Bruce	L	Negative	0	Negative
472	1018	JM-South	32	17	Leaf	Bruce	L	Negative	0	
473	1019	JM-South	32	19	Flower	Bruce	L	Negative	0	Negative
473	1020	JM-South	32	19	Leaf	Bruce	L	Negative	0	
474	1021	JM-South	32	21	Flower	Bruce	L	Negative	0	Negative
474	1022	JM-South	32	21	Leaf	Bruce	L	Negative	0	
475	1023	JM-South	32	23	Flower	Bruce	L	Negative	0	Negative
475	1024	JM-South	32	23	Leaf	Bruce	L	Negative	0	
476	1025	JM-South	32	25	Flower	Bruce	L	Negative	0/48.56	Negative
476	1026	JM-South	32	25	Leaf	Bruce	L	Negative	0	
477	1027	JM-South	30	25	Flower	Bruce	L	Negative	0	Negative
477	1028	JM-South	30	25	Leaf	Bruce	L	Negative	0	
478	1029	JM-South	30	23	Flower	Bruce	L	Negative	0	Negative
478	1030	JM-South	30	23	Leaf	Bruce	L	Negative	0/39.45	

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
479	1031	JM-South	30	21	Flower	Bruce	L	Negative	44.78	Negative
479	1032	JM-South	30	21	Leaf	Bruce	L	Negative	0	
480	1033	JM-South	30	19	Flower	Bruce	L	Negative	0/49.66	Negative
480	1034	JM-South	30	19	Leaf	Bruce	L	Negative	0	
481	1035	JM-South	30	17	Flower	Bruce	L	Negative	0	Negative
481	1036	JM-South	30	17	Leaf	Bruce	L	Negative	0	
482	1037	JM-South	30	15	Flower	Bruce	L	Negative	0	Negative
482	1038	JM-South	30	15	Leaf	Bruce	L	Negative	0	
483	1039	JM-South	30	13	Flower	Bruce	L	Negative	0/43.59	Negative
483	1040	JM-South	30	13	Leaf	Bruce	L	Negative	0	
484	1041	JM-South	30	11	Flower	Bruce	L	Negative	0	Negative
484	1042	JM-South	30	11	Leaf	Bruce	L	Negative	0	
485	1043	JM-South	30	9	Flower	Bruce	L	Negative	0	Negative
485	1044	JM-South	30	9	Leaf	Bruce	L	Negative	0	
486	1045	JM-South	30	7	Flower	Bruce	L	Negative	0	Negative
486	1046	JM-South	30	7	Leaf	Bruce	L	Negative	0	
487	1047	JM-South	30	5	Flower	Bruce	L	Negative	0	Negative
487	1048	JM-South	30	5	Leaf	Bruce	L	Negative	0	
488	1049	JM-South	30	3	Flower	Bruce	L	Negative	0	Negative
488	1050	JM-South	30	3	Leaf	Bruce	L	Negative	0/36.96	
489	1051	JM-North	2	2	Flower	Bruce	L	Negative	0	Negative
489	1052	JM-North	2	2	Leaf	Bruce	L	Negative	0	
490	1053	JM-North	4	21	Flower	Bruce	L	Negative	0	Negative
490	1054	JM-North	4	21	Leaf	Bruce	L	Negative	0	
491	1055	JM-North	4	18	Flower	Bruce	L	Negative	0	Negative
491	1056	JM-North	4	18	Leaf	Bruce	L	Negative	0	
492	1057	JM-North	4	16	Flower	Bruce	L	Negative	0	Negative
492	1058	JM-North	4	16	Leaf	Bruce	L	Negative	0	
493	1059	JM-North	4	12	Flower	Bruce	L	Negative	0	Negative
493	1060	JM-North	4	12	Leaf	Bruce	L	Negative	0	
494	1061	JM-North	4	6	Flower	Bruce	L	Not collected		
494	1062	JM-North	4	6	Leaf	Bruce	L	Negative	0	
495	1063	JM-North	6	2	Flower	Bruce	L	Negative	0	Negative
495	1064	JM-North	6	2	Leaf	Bruce	L	Negative	0	
496	1065	JM-North	6	4	Flower	Bruce	L	Negative	0	Negative
496	1066	JM-North	6	4	Leaf	Bruce	L	Negative	0	
497	1067	JM-North	6	12	Flower	Bruce	L	Positive	28.13	Positive
497	1068	JM-North	6	12	Leaf	Bruce	L	Negative	0	
498	1069	JM-North	8	12	Flower	Bruce	L	Negative	0	Negative
498	1070	JM-North	8	12	Leaf	Bruce	L	Negative	0	
499	1071	JM-North	10	2	Flower	Bruce	L	Negative	0	Negative
499	1072	JM-North	10	2	Leaf	Bruce	L	Negative	0	
500	1073	JM-North	10	8	Flower	Bruce	L	Negative	0	Negative
500	1074	JM-North	10	8	Leaf	Bruce	L	Negative	0	
501	1075	JM-North	10	12	Flower	Bruce	L	Negative	0	Negative
501	1076	JM-North	10	12	Leaf	Bruce	L	Positive	26.74	
502	1101	Ellison-North	36	2	Flower	Bruce	H	Negative	0	Negative
502	1102	Ellison-North	36	2	Leaf	Bruce	H	Negative	37.48	
503	1103	Ellison-North	36		Flower	Bruce	H	Negative	0	Positive
503	1104	Ellison-North	36		Leaf	Bruce	H	Negative	0	

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
504	1105	Ellison-North	36		Flower	Bruce	H	Negative	0	Negative
504	1106	Ellison-North	36		Leaf	Bruce	H	Negative	0	
505	1107	Ellison-North	36		Flower	Bruce	H	Negative	0	Negative
505	1108	Ellison-North	36		Leaf	Bruce	H	Negative	0	
506	1109	Ellison-North	34		Flower	Bruce	H	Negative	0	Negative
506	1110	Ellison-North	34		Leaf	Bruce	H	Negative	0	
507	1111	Ellison-North	34		Flower	Bruce	H	Negative	0	Negative
507	1112	Ellison-North	34		Leaf	Bruce	H	Negative	0	
508	1113	Ellison-North	23		Flower	Bruce	H	Negative	0	Negative
508	1114	Ellison-North	23		Leaf	Bruce	H	Negative	0	
509	1115	Ellison-North	23		Flower	Bruce	H	Negative	0	Negative
509	1116	Ellison-North	23		Leaf	Bruce	H	Negative	0	
510	1117	Ellison-North	23		Flower	Bruce	H	Negative	0	Negative
510	1118	Ellison-North	23		Leaf	Bruce	H	Negative	0	
511	1119	Ellison-North	21		Flower	Bruce	H	Negative	0	Negative
511	1120	Ellison-North	21		Leaf	Bruce	H	Negative	0	
512	1121	Ellison-North	19		Flower	Bruce	H	Negative	0	Negative
512	1122	Ellison-North	19		Leaf	Bruce	H	Negative	0	
513	1123	Ellison-North	17		Flower	Bruce	H	Negative	0	Negative
513	1124	Ellison-North	17		Leaf	Bruce	H	Negative	0	
514	1151	3	4	1	Flower	Bruce	L	Negative	0	Negative
514	1152	3	4	1	Leaf	Bruce	L	Negative	0	
515	1153	3	4	2	Flower	Bruce	L	Negative	0	Negative
515	1154	3	4	2	Leaf	Bruce	L	Negative	0	
516	1155	3	4	5	Flower	Bruce	L	Negative	0	Negative
516	1156	3	4	5	Leaf	Bruce	L	Negative	0	
517	1157	3	4	7	Flower	Bruce	L	Negative	0	Negative
517	1158	3	4	7	Leaf	Bruce	L	Negative	0	
518	1159	3	4	9	Flower	Bruce	L	Negative	0	Negative
518	1160	3	4	9	Leaf	Bruce	L	Negative	0	
519	1161	3	4	12	Flower	Bruce	L	Negative	0	Negative
519	1162	3	4	12	Leaf	Bruce	L	Negative	0	
520	1163	3	4	13	Flower	Bruce	L	Negative	0/46.02	Negative
520	1164	3	4	13	Leaf	Bruce	L	Negative	0	
521	1165	3	4	14	Flower	Bruce	L	Negative	0	Negative
521	1166	3	4	14	Leaf	Bruce	L	Negative	0	
522	1167	3	4	15	Flower	Bruce	L	Negative	0	Negative
522	1168	3	4	15	Leaf	Bruce	L	Negative	0	
523	1169	3	4	16	Flower	Bruce	L	Negative	0	Negative
523	1170	3	4	16	Leaf	Bruce	L	Positive	24.72	
524	1171	3	4	17	Flower	Bruce	L	Negative	0	Negative
524	1172	3	4	17	Leaf	Bruce	L	Negative	0	
525	1173	3	4	18	Flower	Bruce	L	Negative	0	Negative
525	1174	3	4	18	Leaf	Bruce	L	Positive	25.73	

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
526	1175	3	4	19	Flower	Bruce	L	Negative	0	Negative
526	1176	3	4	19	Leaf	Bruce	L	Negative	0	
527	1177	3	4	21	Flower	Bruce	L	Not collected		
527	1178	3	4	21	Leaf	Bruce	L	Negative	0	
528	1179	3	6	7	Flower	Bruce	L	Negative	0	Negative
528	1180	3	6	7	Leaf	Bruce	L	Weak positive	33.92	Positive
529	1181	3	6	9	Flower	Bruce	L	Negative	0/46.9	Negative
529	1182	3	6	9	Leaf	Bruce	L	Not collected		
530	1183	3	6	11	Flower	Bruce	L	Negative	0	Negative
530	1184	3	6	11	Leaf	Bruce	L	Negative	35.98	
531	1185	3	6	18	Flower	Bruce	L	Not collected		
531	1186	3	6	18	Leaf	Bruce	L	Negative	0	
532	1187	3	6	19	Flower	Bruce	L	Negative	0	Negative
532	1188	3	6	19	Leaf	Bruce	L	Negative	0	
533	1189	3	6	21	Flower	Bruce	L	Negative	0	Negative
533	1190	3	6	21	Leaf	Bruce	L	Negative	0	
534	1191	3	6	22	Flower	Bruce	L	Not collected		
534	1192	3	6	22	Leaf	Bruce	L	Negative	0	
535	1193	3	6	23	Flower	Bruce	L	Negative	0	Negative
535	1194	3	6	23	Leaf	Bruce	L	Negative	0	
536	1195	3	6	24	Flower	Bruce	L	Negative	0	Negative
536	1196	3	6	24	Leaf	Bruce	L	Negative	0	
537	1197	3	6	26	Flower	Bruce	L	Negative	0/48.29	Negative
537	1198	3	6	26	Leaf	Bruce	L	Negative	0	
538	1199	4	4	26	Flower	Bruce	L	Not collected		
538	1200	4	4	26	Leaf	Bruce	L	Negative	0	
539	1201	3	2	25	Flower	Bruce	L	Negative	0	Negative
539	1202	3	2	25	Leaf	Bruce	L	Negative	0	
540	1203	3	2	24	Flower	Bruce	L	Negative	0	Negative
540	1204	3	2	24	Leaf	Bruce	L	Negative	0	
541	1251	1	1	1	Flower	Bruce	L	Negative	0	Negative
541	1252	1	1	1	Leaf	Bruce	L	Negative	0	
542	1253	1	1	2	Flower	Bruce	L	Negative	0	Negative
542	1254	1	1	2	Leaf	Bruce	L	Weak positive	32.49	
543	1255	1	1	3	Flower	Bruce	L	Negative	0	Negative
543	1256	1	1	3	Leaf	Bruce	L	Negative	39.23	
544	1257	1	1	4	Flower	Bruce	L	Negative	0	Negative
544	1258	1	1	4	Leaf	Bruce	L	Negative	0	
545	1259	1	1	5	Flower	Bruce	L	Negative	0	Negative
545	1260	1	1	5	Leaf	Bruce	L	Negative	0	
546	1261	1	1	6	Flower	Bruce	L	Negative	0	Negative
546	1262	1	1	6	Leaf	Bruce	L	Negative	0	
547	1263	1	1	7	Flower	Bruce	L	Negative	0	Negative
547	1264	1	1	7	Leaf	Bruce	L	Negative	0	
548	1265	1	1	8	Flower	Bruce	L	Negative	0/48.58	Negative
548	1266	1	1	8	Leaf	Bruce	L	Negative	0	
549	1267	1	1	9	Flower	Bruce	L	Negative	0	Negative
549	1268	1	1	9	Leaf	Bruce	L	Negative	38.01	
550	1269	1	1	10	Flower	Bruce	L	Negative	0	Negative

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
550	1270	1	1	10	Leaf	Bruce	L	Negative	0	
551	1271	1	1	11	Flower	Bruce	L	Negative	0	Negative
551	1272	1	1	11	Leaf	Bruce	L	Negative	0	
552	1273	1	1	12	Flower	Bruce	L	Negative	0	Negative
552	1274	1	1	12	Leaf	Bruce	L	Negative	0	
553	1275	1	1	13	Flower	Bruce	L	Negative	0/46.81	Negative
553	1276	1	1	13	Leaf	Bruce	L	Positive	25.24	
554	1277	1	1	14	Flower	Bruce	L	Weak positive	40.36	Negative
554	1278	1	1	14	Leaf	Bruce	L	Negative	36.6	
555	1279	1	1	15	Flower	Bruce	L	Positive	33.04	Negative
555	1280	1	1	15	Leaf	Bruce	L	Negative	0	
556	1281	1	1	16	Flower	Bruce	L	Negative	43.7	Negative
556	1282	1	1	16	Leaf	Bruce	L	Weak positive	34.61	
557	1283	1	1	17	Flower	Bruce	L	Negative	0	Negative
557	1284	1	1	17	Leaf	Bruce	L	Weak positive	34.3	
558	1285	1	1	18	Flower	Bruce	L	Negative	0	Negative
558	1286	1	1	18	Leaf	Bruce	L	Weak positive	31.3	
559	1287	1	1	19	Flower	Bruce	L	Negative	0	Negative
559	1288	1	1	19	Leaf	Bruce	L	Negative	0	
560	1289	1	1	20	Flower	Bruce	L	Negative	0	Negative
560	1290	1	1	20	Leaf	Bruce	L	Weak positive	31.13	
561	1291	1	1	21	Flower	Bruce	L	Negative	0	Negative
561	1292	1	1	21	Leaf	Bruce	L	Weak positive	30.56	
562	1293	1	1	22	Flower	Bruce	L	Negative	0	Negative
562	1294	1	1	22	Leaf	Bruce	L	Negative	0	
563	1295	1	1	23	Flower	Bruce	L	Negative	0	Negative
563	1296	1	1	23	Leaf	Bruce	L	Negative	0	
564	1297	1	1	24	Flower	Bruce	L	Positive	32.33	Negative
564	1298	1	1	24	Leaf	Bruce	L	Weak positive	30.86	
565	1299	1	1	25	Flower	Bruce	L	Weak positive	40.21	Negative
565	1300	1	1	25	Leaf	Bruce	L	Positive	23.23	
566	1301	1	1	25	Flower	Bruce	L	Positive	34.31	Negative
566	1302	1	1	25	Leaf	Bruce	L	Positive	19.72	
567	1303	1	1	24	Flower	Bruce	L	Positive	33.69	Negative
567	1304	1	1	24	Leaf	Bruce	L	Positive	20.06	
568	1351	1	6	1	Flower	Bruce	L	Negative	0	Negative
568	1352	1	6	1	Leaf	Bruce	L	Positive	25.3	
569	1353	1	6	2	Flower	Bruce	L	Negative	0	Negative
569	1354	1	6	2	Leaf	Bruce	L	Positive	21.73	
570	1355	1	6	3	Flower	Bruce	L	Positive	33.24	Negative
570	1356	1	6	3	Leaf	Bruce	L	Negative	35.19	
571	1357	1	6	4	Flower	Bruce	L	Negative	0	Negative
571	1358	1	6	4	Leaf	Bruce	L	Weak positive	30.79	
572	1359	1	6	5	Flower	Bruce	L	Positive	34.79	Positive
572	1360	1	6	5	Leaf	Bruce	L	Negative	37	
573	1361	1	6	6	Flower	Bruce	L	Negative	0	Positive
573	1362	1	6	6	Leaf	Bruce	L	Weak positive	31.91	
574	1363	1	6	7	Flower	Bruce	L	Positive	33.51	Positive

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
574	1364	1	6	7	Leaf	Bruce	L	Weak positive	34.28	
575	1365	1	6	8	Flower	Bruce	L	Negative	0	Negative
575	1366	1	6	8	Leaf	Bruce	L	Negative	0/39.32	
576	1367	1	6	9	Flower	Bruce	L	Negative	0	Negative
576	1368	1	6	9	Leaf	Bruce	L	Negative	0	
577	1369	1	6	10	Flower	Bruce	L	Positive	34.05	Negative
577	1370	1	6	10	Leaf	Bruce	L	Weak positive	34.68	
578	1371	1	6	11	Flower	Bruce	L	Negative	0	Negative
578	1372	1	6	11	Leaf	Bruce	L	Negative	0/45.11	
579	1373	1	6	12	Flower	Bruce	L	Negative	0	Positive
579	1374	1	6	12	Leaf	Bruce	L	Negative	0/48.7	
580	1375	1	6	13	Flower	Bruce	L	Positive	33.92	Negative
580	1376	1	6	13	Leaf	Bruce	L	Negative	0	
581	1377	1	6	14	Flower	Bruce	L	Negative	0	Negative
581	1378	1	6	14	Leaf	Bruce	L	Negative	0	
582	1379	1	6	15	Flower	Bruce	L	Negative	0	Negative
582	1380	1	6	15	Leaf	Bruce	L	Negative	0	
583	1381	1	6	16	Flower	Bruce	L	Negative	0	Negative
583	1382	1	6	16	Leaf	Bruce	L	Negative	0	
584	1383	1	6	17	Flower	Bruce	L	Positive	32.56	Positive
584	1384	1	6	17	Leaf	Bruce	L	Weak positive	34.77	
585	1385	1	6	18	Flower	Bruce	L	Negative	0	Negative
585	1386	1	6	18	Leaf	Bruce	L	Negative	35.07	
586	1387	1	6	19	Flower	Bruce	L	Negative	0	Negative
586	1388	1	6	19	Leaf	Bruce	L	Weak positive	33.11	
587	1389	1	6	20	Flower	Bruce	L	Positive	32.55	Negative
587	1390	1	6	20	Leaf	Bruce	L	Negative	0/40.07*	
588	1391	1	6	21	Flower	Bruce	L	Negative	0	Negative
588	1392	1	6	21	Leaf	Bruce	L	Negative	38.18	
589	1393	1	6	22	Flower	Bruce	L	Negative	0	Negative
589	1394	1	6	22	Leaf	Bruce	L	Negative	36.77	
590	1395	1	6	23	Flower	Bruce	L	Positive	33.31	Positive
590	1396	1	6	23	Leaf	Bruce	L	Negative	38.26	
591	1397	1	6	24	Flower	Bruce	L	Negative	0	Negative
591	1398	1	6	24	Leaf	Bruce	L	Negative	0	
592	1399	1	6	25	Flower	Bruce	L	Negative	0	Negative
592	1400	1	6	25	Leaf	Bruce	L	Negative	0/41.4	
593	1401	3	4	1	Flower	Bruce	L	Negative	0	Negative
593	1402	3	4	1	Leaf	Bruce	L	Positive	24.21	
594	1403	3	4	2	Flower	Bruce	L	Negative	0	Negative
594	1404	3	4	2	Leaf	Bruce	L	Negative	0	
595	1405	3	4	4	Flower	Bruce	L	Negative	0	Negative
595	1406	3	4	4	Leaf	Bruce	L	Positive	23.15	
596	1407	3	4	6	Flower	Bruce	L	Negative	0	Negative
596	1408	3	4	6	Leaf	Bruce	L	Negative	0/37.11	
597	1409	3	4	8	Flower	Bruce	L	Negative	0	Negative
597	1410	3	4	8	Leaf	Bruce	L	Negative	0	
598	1451	2	1	1	Flower	Bruce	L	Positive	23.6	
598	1452	2	1	1	Leaf	Bruce	L	Negative	0	Negative
599	1453	2	1	2	Flower	Bruce	L	Negative	0	Negative
599	1454	2	1	2	Leaf	Bruce	L	Negative	0	

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
600	1455	2	1	3	Flower	Bruce	L	Negative	0	Negative
600	1456	2	1	3	Leaf	Bruce	L	Negative	35.03	
601	1457	2	1	4	Flower	Bruce	L	Negative	0	Negative
601	1458	2	1	4	Leaf	Bruce	L	Positive	27.15	
602	1459	2	1	5	Flower	Bruce	L	Positive	33.54	Positive
602	1460	2	1	5	Leaf	Bruce	L	Weak positive	33.3	
603	1461	2	1	6	Flower	Bruce	L	Negative	0	Negative
603	1462	2	1	6	Leaf	Bruce	L	Weak positive	31.49	
604	1463	2	1	7	Flower	Bruce	L	Negative	0	Negative
604	1464	2	1	7	Leaf	Bruce	L	Weak positive	33.78	
605	1465	2	1	9	Flower	Bruce	L	Negative	0	Negative
605	1466	2	1	9	Leaf	Bruce	L	Negative	0	
606	1467	2	1	10	Flower	Bruce	L	Not collected		
606	1468	2	1	10	Flower	Bruce	L	Negative	0	Negative
607	1469	2	1	11	Leaf	Bruce	L	Negative		
607	1470	2	1	11	Leaf	Bruce	L	Weak positive	33.85	
608	1471	2	1	13	Flower	Bruce	L	Negative	0	Negative
608	1472	2	1	13	Leaf	Bruce	L	Weak positive	30.96	
609	1473	2	1	14	Flower	Bruce	L	Negative	0	Negative
609	1474	2	1	14	Leaf	Bruce	L	Negative	0	
610	1475	2	1	15	Flower	Bruce	L	Negative	0	Negative
610	1476	2	1	15	Leaf	Bruce	L	Negative	0	
611	1477	2	1	16	Flower	Bruce	L	Negative	0	Negative
611	1478	2	1	16	Leaf	Bruce	L	Weak positive	33.48	
612	1479	2	1	17	Flower	Bruce	L	Negative	0	Negative
612	1480	2	1	17	Leaf	Bruce	L	Negative	0	
613	1481	2	1	18	Flower	Bruce	L	Negative	0	Negative
613	1482	2	1	18	Leaf	Bruce	L	Negative	0	
614	1483	2	1	19	Flower	Bruce	L	Negative	0	Negative
614	1484	2	1	19	Leaf	Bruce	L	Negative	0	
615	1485	2	1	20	Flower	Bruce	L	Negative	0	Negative
615	1486	2	1	20	Leaf	Bruce	L	Negative	0	
616	1487	2	1	21	Flower	Bruce	L	Negative	0	Negative
616	1488	2	1	21	Leaf	Bruce	L	Negative	0	
617	1489	2	1	22	Flower	Bruce	L	Negative	0	Negative
617	1490	2	1	22	Leaf	Bruce	L	Negative	0	
618	1491	2	1	23	Flower	Bruce	L	Negative	0	Negative
618	1492	2	1	23	Leaf	Bruce	L	Negative	0	
619	1493	2	1	24	Flower	Bruce	L	Negative	0	Negative
619	1494	2	1	24	Leaf	Bruce	L	Weak positive	34.05	
620	1495	2	1	25	Flower	Bruce	L	Negative	0	Negative
620	1496	2	1	25	Leaf	Bruce	L	Weak positive	31.37	
621	1497	3	1	25	Flower	Bruce	L	Negative	0	Negative
621	1498	3	1	25	Leaf	Bruce	L	Negative	0	
622	1499	3	1	24	Flower	Bruce	L	Negative	0	Negative
622	1500	3	1	24	Leaf	Bruce	L	Negative	0	
623	1501	8	1	1	Flower	Bruce	H	Weak positive	35.23	Positive
623	1502	8	1	1	Leaf	Bruce	H	Positive	19.49	

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
624	1503	8	1	2	Flower	Bruce	H	Positive	34.95	Negative
624	1504	8	1	2	Leaf	Bruce	H	Positive	19.51	
625	1505	8	1	3	Flower	Bruce	H	Negative	0	Negative
625	1506	8	1	3	Leaf	Bruce	H	Positive	17.93	
626	1507	8	1	4	Flower	Bruce	H	Negative	0	Negative
626	1508	8	1	4	Leaf	Bruce	H	Positive	18.77	
627	1509	8	1	5	Flower	Bruce	H	Weak positive	36.38	Negative
627	1510	8	1	5	Leaf	Bruce	H	Positive	16.92	
628	1511	8	1	6	Flower	Bruce	H	Negative	0	Negative
628	1512	8	1	6	Leaf	Bruce	H	Negative	35.04	
629	1513	8	1	7	Flower	Bruce	H	Positive	34.29	Negative
629	1514	8	1	7	Leaf	Bruce	H	Positive	16.28	
630	1515	8	1	8	Flower	Bruce	H	Positive	27.47	Positive
630	1516	8	1	8	Leaf	Bruce	H	Positive	18.02	
631	1517	8	1	9	Flower	Bruce	H	Negative	0	Negative
631	1518	8	1	9	Leaf	Bruce	H	Weak positive	30.09	
632	1519	8	1	10	Flower	Bruce	H	Weak positive	35.25	Positive
632	1520	8	1	10	Leaf	Bruce	H	Weak positive	31.24	
633	1521	8	1	11	Flower	Bruce	H	Positive	31.3	Positive
633	1522	8	1	11	Leaf	Bruce	H	Positive	14.5	
634	1523	8	1	12	Flower	Bruce	H	Weak positive	35.45	Negative
634	1524	8	1	12	Leaf	Bruce	H	Positive	17.53	
635	1525	8	1	13	Flower	Bruce	H	Positive	29.07	Positive
635	1526	8	1	13	Leaf	Bruce	H	Positive	24.45	
636	1527	8	1	14	Flower	Bruce	H	Positive	30.26	Negative
636	1528	8	1	14	Leaf	Bruce	H	Positive	20.54	
637	1529	8	1	15	Flower	Bruce	H	Negative	0	Negative
637	1530	8	1	15	Leaf	Bruce	H	Positive	28.29	
638	1531	8	1	16	Flower	Bruce	H	Negative	0	Negative
638	1532	8	1	16	Leaf	Bruce	H	Positive	15.99	
639	1533	8	1	17	Flower	Bruce	H	Negative	0	Negative
639	1534	8	1	17	Leaf	Bruce	H	Positive	20.17	
640	1535	8	1	18	Flower	Bruce	H	Positive	33.23	Negative
640	1536	8	1	18	Leaf	Bruce	H	Positive	15.99	
641	1537	8	1	19	Flower	Bruce	H	Positive	30.2	Negative
641	1538	8	1	19	Leaf	Bruce	H	Positive	26.55	
642	1539	8	1	20	Flower	Bruce	H	Negative	0	Negative
642	1540	8	1	20	Leaf	Bruce	H	Positive	18.35	
643	1541	8	1	21	Flower	Bruce	H	Negative	0/48.24	Negative
643	1542	8	1	21	Leaf	Bruce	H	Positive	16.61	
644	1543	8	1	22	Flower	Bruce	H	Negative	0	Negative
644	1544	8	1	22	Leaf	Bruce	H	Positive	20.65	
645	1545	8	1	23	Flower	Bruce	H	Positive	34.9	Negative
645	1546	8	1	23	Leaf	Bruce	H	Positive	14.88	
646	1547	8	1	24	Flower	Bruce	H	Negative	0	Negative
646	1548	8	1	24	Leaf	Bruce	H	Positive	15.37	
647	1549	8	1	25	Flower	Bruce	H	Positive	28.68	Positive
647	1550	8	1	25	Leaf	Bruce	H	Positive	22.25	
648	1551	8	1	26	Flower	Bruce	H	Negative	0	Negative
648	1552	8	1	26	Leaf	Bruce	H	Positive	23.33	

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
649	1553	8	1	27	Flower	Bruce	H	Negative	0	Negative
649	1554	8	1	27	Leaf	Bruce	H	Positive	22.61	
650	1555	8	1	28	Flower	Bruce	H	Negative	0	Negative
650	1556	8	1	28	Leaf	Bruce	H	Positive	26.86	
651	1557	8	1	29	Flower	Bruce	H	Negative	0	Negative
651	1558	8	1	29	Leaf	Bruce	H	Positive	23.98	
652	1559	8	1	30	Flower	Bruce	H	Positive	34.21	Negative
652	1560	8	1	30	Leaf	Bruce	H	Positive	24.01	
653	1561	8	1	31	Flower	Bruce	H	Negative	0/46.69	Negative
653	1562	8	1	31	Leaf	Bruce	H	Negative	0	
654	1563	8	1	32	Flower	Bruce	H	Negative	0	Negative
654	1564	8	1	32	Leaf	Bruce	H	Negative	0	
655	1565	8	1	33	Flower	Bruce	H	Negative	0	Negative
655	1566	8	1	33	Leaf	Bruce	H	Positive	20.87	
656	1567	8	1	34	Flower	Bruce	H	Negative	0	Negative
656	1568	8	1	34	Leaf	Bruce	H	Positive	22.93	
657	1569	8	3	21	Flower	Bruce	H	Positive	33.6	Negative
657	1570	8	3	21	Leaf	Bruce	H	Negative	0	
658	1571	8	3	15	Flower	Bruce	H	Positive	30.46	Negative
658	1572	8	3	15	Leaf	Bruce	H	Positive	15.96	
659	1573	8	3	12	Flower	Bruce	H	Positive	29.57	Negative
659	1574	8	3	12	Leaf	Bruce	H	Negative	0	
660	1575	8	3	11	Flower	Bruce	H	Positive	32.76	Positive
660	1576	8	3	11	Leaf	Bruce	H	Positive	20.61	
661	1577	8	3	1	Flower	Bruce	H	Positive	26.68	Positive
661	1578	8	3	1	Leaf	Bruce	H	Negative	0	
662	1579	8	3	6	Flower	Bruce	H	Positive	32.84	Negative
662	1580	8	3	6	Leaf	Bruce	H	Weak positive	34.52	
663	1581	8	3	5	Flower	Bruce	H	Negative	0/46.54	Negative
663	1582	8	3	5	Leaf	Bruce	H	Positive	18.5	
664	1583	8	3	4	Flower	Bruce	H	Positive	31.86	Negative
664	1584	8	3	4	Leaf	Bruce	H	Positive	16.07	
665	1585	8	3	3	Flower	Bruce	H	Negative	0	Negative
665	1586	8	3	3	Leaf	Bruce	H	Positive	25.99	
666	1601	9	4	1	Flower	Bruce	H	Positive	33.33	Positive
666	1602	9	4	1	Leaf	Bruce	H	Positive	18.69	
667	1603	9	4	2	Flower	Bruce	H	Weak positive	35.12	Positive
667	1604	9	4	2	Leaf	Bruce	H	Positive	16.01	
668	1605	9	4	3	Flower	Bruce	H	Negative	0	Negative
668	1606	9	4	3	Leaf	Bruce	H	Positive	17.94	
669	1607	9	4	4	Flower	Bruce	H	Negative	0	Negative
669	1608	9	4	4	Leaf	Bruce	H	Positive	17.16	
670	1609	9	4	5	Flower	Bruce	H	Positive	32.92	Positive
670	1610	9	4	5	Leaf	Bruce	H	Positive	28.41	
671	1611	9	4	6	Flower	Bruce	H	Positive	25.2	Positive
671	1612	9	4	6	Leaf	Bruce	H	Positive	26.46	
672	1613	9	4	7	Flower	Bruce	H	Weak positive	36.78	Negative
672	1614	9	4	7	Leaf	Bruce	H	Positive	22.24	
673	1615	9	4	8	Flower	Bruce	H	Negative	0	Negative
673	1616	9	4	8	Leaf	Bruce	H	Positive	15.43	
674	1617	9	4	9	Flower	Bruce	H	Positive	34.33	Positive

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
674	1618	9	4	9	Leaf	Bruce	H	Positive	17.43	
675	1619	9	4	10	Flower	Bruce	H	Positive	33.67	Positive
675	1620	9	4	10	Leaf	Bruce	H	Positive	15.58	
676	1621	9	4	11	Flower	Bruce	H	Weak positive	36.26	Negative
676	1622	9	4	11	Leaf	Bruce	H	Positive	17.92	
677	1623	9	4	12	Flower	Bruce	H	Negative	0	Negative
677	1624	9	4	12	Leaf	Bruce	H	Positive	14.46	
678	1625	9	4	13	Flower	Bruce	H	Positive	31.91	Negative
678	1626	9	4	13	Leaf	Bruce	H	Positive	16.33	
679	1627	9	4	14	Flower	Bruce	H	Weak positive	35.66	Negative
679	1628	9	4	14	Leaf	Bruce	H	Positive	15.52	
680	1629	9	4	15	Flower	Bruce	H	Weak positive	37.95	Positive
680	1630	9	4	15	Leaf	Bruce	H	Positive	14.19	
681	1631	9	4	16	Flower	Bruce	H	Negative	0	Negative
681	1632	9	4	16	Leaf	Bruce	H	Positive	22.17	
682	1633	9	4	17	Flower	Bruce	H	Positive	31.84	Positive
682	1634	9	4	17	Leaf	Bruce	H	Positive	14.38	
683	1635	9	4	18	Flower	Bruce	H	Positive	35.23/44.51	Positive
683	1636	9	4	18	Leaf	Bruce	H	Positive	14.16	
684	1637	9	4	19	Flower	Bruce	H	Positive	34.67	Positive
684	1638	9	4	19	Leaf	Bruce	H	Positive	14.69	
685	1639	9	4	20	Flower	Bruce	H	Negative	0	Negative
685	1640	9	4	20	Leaf	Bruce	H	Positive	22.68	
686	1641	9	4	21	Flower	Bruce	H	Negative	0	Negative
686	1642	9	4	21	Leaf	Bruce	H	Positive	14.77	
687	1643	9	4	22	Flower	Bruce	H	Negative	0	Positive
687	1644	9	4	22	Leaf	Bruce	H	Positive	15.55	
688	1645	9	4	23	Flower	Bruce	H	Positive	34.29	Negative
688	1646	9	4	23	Leaf	Bruce	H	Positive	29.16	
689	1647	9	4	24	Flower	Bruce	H	Negative	0	Negative
689	1648	9	4	24	Leaf	Bruce	H	Positive	23.56	
690	1649	9	4	25	Flower	Bruce	H	Positive	30.12	Negative
690	1650	9	4	25	Leaf	Bruce	H	Positive	18.26	
691	1651	9	4	26	Flower	Bruce	H	Negative	0/49.33	Negative
691	1652	9	4	26	Leaf	Bruce	H	Weak positive	33.59	
692	1653	9	4	27	Flower	Bruce	H	Negative	0/46.37	Positive
692	1654	9	4	27	Leaf	Bruce	H	Negative	35.94	
693	1655	9	4	28	Flower	Bruce	H	Negative	0	Negative
693	1656	9	4	28	Leaf	Bruce	H	Weak positive	33.52	
694	1657	9	4	29	Flower	Bruce	H	Negative	0	Negative
694	1658	9	4	29	Leaf	Bruce	H	Weak positive	34.7	
695	1659	9	6	13	Flower	Bruce	H	Negative	0	Negative
695	1660	9	6	13	Leaf	Bruce	H	Positive	21.54	
696	1661	9	6	12	Flower	Bruce	H	Positive	33.24	Positive
696	1662	9	6	12	Leaf	Bruce	H	Positive	23.21	
697	1663	9	6	11	Flower	Bruce	H	Positive	34.66	Negative
697	1664	9	6	11	Leaf	Bruce	H	Positive	22.36	
698	1665	9	6	9	Flower	Bruce	H	Positive	34.3	Negative
698	1666	9	6	9	Leaf	Bruce	H	Positive	18.73	
699	1667	9	6	8	Flower	Bruce	H	Positive	30.87	Negative

Plant #	Sample #	Block	Row	Bay	Popcorn or Leaf sample	Host / Variety	High vs Low prevalence	PCR test (Rees George)	Ct value	Culture (KBC)
699	1668	9	6	8	Leaf	Bruce	H	Positive	18.66	
700	1669	9	6	7	Flower	Bruce	H	Positive	34.52	Positive
700	1670	9	6	7	Leaf	Bruce	H	Positive	18.52	
701	1671	9	6	6	Flower	Bruce	H	Weak positive	36.49	Positive
701	1672	9	6	6	Leaf	Bruce	H	Positive	20.41	
702	1673	9	6	5	Flower	Bruce	H	Negative	0	Negative
702	1674	9	6	5	Leaf	Bruce	H	Positive	22.38	
703	1675	9	6	4	Flower	Bruce	H	Negative	0	Negative
703	1676	9	6	4	Leaf	Bruce	H	Positive	17.86	
704	1677	9	6	3	Flower	Bruce	H	Negative	0	Negative
704	1678	9	6	3	Leaf	Bruce	H	Positive	19.06	
705	1679	9	6	2	Flower	Bruce	H	Weak positive	36.14	Positive
705	1680	9	6	2	Leaf	Bruce	H	Positive	21.75	