

AUTHOR	YEAR	COUNTRY	HOST	PHYTOPHTHORA SPECIES	LABORATORY / GLASSHOUSE / FIELD
D'Souza.A.A	2005	Australia	Banksia grandis	P. cinnamomi	Glasshouse
Joo. G	2005	Korea	Capsicum annuum (Red Pepper)	P. capsici	In vitro inhibition assay / Glasshouse
Jung. W. J	2005	Korea		P. capsici	Glasshouse in vivo
Rajkumar. M	2005	South Korea	Capsicum annuum	P. capsici	In vitro dual culture, detached leaf assay and Petri dish
Ezziyyani. M	2007	Spain	Capsicum annuum	P. capsici	In vitro, in vivo - nursery
Lee J.K	2008	South Korea	Capsicum annuum	P. capsici	In vitro challenge assay. In vivo
Sang. M. Y	2008	Korea	<i>Capsicum annuum</i> cv Nockwang	P. capsici	In vitro / in planta (Glasshouse presumably) / Field Test
Alexander.B.J.R	2001	New Zealand	Malus domestica	P. cactorum	Glasshouse
Kim. S.G	2010	Korea		P. capsici	In vitro
Segarra et al	2013	Spain	Capsicum annuum	P. capsici	Growth Chamber as well as Greenhouse
A. Faye, et al	2013	Kenya	<i>Zea mays</i> L.	N/A	Green House.
Ozyilmaz. U	2013	Turkey	<i>Capsicum annuum</i> var California Wonder	P. capsici	In vitro/Greenhouse
Liu. H	2014	China	<i>Capsicum annuum</i> var Bian'jiae No.1	P. capsici strain BP05	Nursery
Mbarga. J. B	2014	Cameroon	<i>Theobroma cacao</i>	P. megakarya EL1	In vitro. Field test.
Widmer. T	2014	USA		P. ramorum	In vitro dual culture, soil bioassay
Victoria-Arellano.A.D. Et al	2015	Mexico	<i>Capsicum annuum</i> L. Serrano	P. capsici	In vitro challenge assay
Hung, et al	2015	Thailand	Pomelo - <i>Citrus maxima</i>	P. nicotianae	In vitro / in vivo
Hung. P.M et al	2015	Thailand	Citrus maxima	P. palmivora	In vitro challenge assay, crude extract assay
Dianez Martinez.F.	2016		<i>Capsicum annuum</i> L. cv, Acorde RZF1	Many. + <i>P. capsici</i> and <i>P. parasitica</i>	Nursery/Greenhouse
Yao. Y	2016	China	Potato cv Favorita	P. infestans	In vitro dual culture / Glasshouse / Field Trial
Bae. SJ, et al.	2016	Korea	Capsicum annuum cv Bugang, Solanum lycopersicon	P. cactorum, P. capsici, P. dreschleri, P. infestans, P. melonis, P. nicotianae, P. sojae	Petri Dish
Bhai. RS, Et al	2016	India	Piper nigrum var Sreekara	P. capsici	In vitro, then glasshouse
Garcia-Nunez. H	2017	Mexico		P. infestans	In vitro
Zhang. M	2016	China	<i>Capsicum annuum</i> var Bola No.5	P. capsici	in vitro / in vivo (Glasshouse presumably)
Jing et al.	2017	China	Tobacco - Small Gold 1025.	P. nicotianae	In vitro. Field Trial.
Kowalska.J	2017	Poland	Potato, not specified what variety	P. infestans	Greenhouse and Field Trials
Lu, et al.	2017	China	Soybean	P. sojae isolate P6497 Race 2	Leaf dip then <i>P. sojae</i> introduction. "Greenhouse" Trials
Morrison, et al	2017	Canada	Solanum tuberosum	P. infestans	In vitro confrontational assays. Direct potato tuber inoculation
Raut.I et al	2017	Romania	Capsicum annuum cv Lamuyo	P. parasitica	In vitro / in vivo
Reyes-Tena et al	2017	Mexico	<i>Capsicum annuum</i> - Poblano "San Luis" variety	P. capsici	Greenhouse - Then Field
Ros. M	2017	Spain	<i>Capsicum annuum</i> cv Lamuyo	P. nicotianae	
Tayo. P	2017	Cameroon	Theobroma cacao	P. megakarya	Greenhouse - Then Field
Tchameni. S. N	2017	Cameroon	<i>Theobroma cacao</i> SNK213	P. megakarya	In vitro / Maybe greenhouse? They don't state where
Uc-Arguelles. A	2017	Mexico	<i>Capsicum annuum</i> var Jalapeno M	P. capsici	In vitro / greenhouse
Villamizar-Gallardo. R	2017	Colombia	<i>Theobroma cacao</i> L	P. palmivora	In vitro
Widmer, Et al	2017	USA	Viburnum tinus	P. ramorum isolate CDFA 83-2	Greenhouse - Then Field
Zhang.S et al	2017	China	Potato, not specified what variety	P. infestans	In vitro/planta style assay.
Alaux. P, et al	2018	Europe/Belgium	Solanum tuberosum	P. infestans	Greenhouse - Then Field
Arfaoui, et al	2018	Manitoba - Canada	Soybean	P. sojae	Glasshouse
Corato et al	2018	Italy	<i>Lycopersicon esculantum</i> for <i>P. nicotianae</i>	Pythium ultimum, Rhizoctonia solani, P. nicotianae, Verticillium dahliae, Fusarium oxysporum	Greenhouse - Then Field
de Vries, et al	2018	Germany	<i>Solanum lycopersicum</i> cv. M82	9 X <i>P. infestans</i> isolates	in vitro + in planta
El-Sayed et al	2018	USA	Smilax bona-nox	P. parasitica	In vitro. Paper disc diffusion assay.
Khalaf and Raizada	2018	Egypt		Rhizoctonia solani, Fusarium graminearum, Phytophthora capsici, Pythium aphanidicium	In vitro.
Mendez-Bravo, et al	2018	Mexico		P. cinnamomi	In vitro.
Mmbaga, et al	2018	USA	Capsicum annuum cv Pepper Cayenne, Numex	P. capsici, P. nicotianae, P. irrigata, P. cryptogea. Fusarium solani, Fusarium oxysporum	Growth Chamber in vitro.
Nawaz, et al	2018	Pakistan	Capsicum annuum	P. capsici	In vitro, greenhouse.
Ndongue, et al.	2018	Cameroon	Theobroma cacao	P. megakarya	Field Conditions
Ramirez-Delgado, et al	2018	Mexico		2 X Mexican <i>P. capsici</i> isolates RDP-1 RDP-2	in vitro dual culture
Sanchez San Fulgencio et al	2018	Spain	<i>Capsicum annuum</i> L., var. Sweet Italian	P. capsici, Rhizoctonia solani, Fusarium oxysporum f.sp melonis, Pythium ultimum	In vitro, dual culture. In vivo Greenhouse with <i>P. capsici</i>
Sanchez-Cruz.R et al	2019	Mexico	Mimosa pudica	P. capsici	In vitro challenge assay
Sang, et al	2018	Korea	Presumably <i>C. annuum</i>	P. capsici	Indoor Grow room, sterile medium
Thuerig.B	2018	Switzerland		P. infestans	In vitro - 96well plate. Germination rates. Glasshouse
Uddin.M	2018	Pakistan	Lycopersicon esculantum	P. capsici	In vitro/Greenhouse
Wagner, et al	2018	USA		P. sojae. Pythium heterothalicum, Pythium irregulare, Pythium sylvaticum, Pythium	Petri dish challenge assays
Widmer, Et al	2018	USA	Nursery soil	P. ramorum isolate CDFA 83-2	Nursery/Actual Field Trial
Wu.L. Et al	2018	China	Nicotiana benthamiana	P. nicotianae	In planta assays
Xiao. K	2002	USA	<i>Medicago sativa</i> and Glycine max	<i>P. medicaginis</i> and <i>P. sojae</i>	In vitro challenge assays plus soil assay

DIRECT OR INDIRECT EFFECT	BIO CONTROL ORGANISM
	Fifteen legume species. <i>Acacia alata</i> , <i>A. drummondii</i> , <i>A. extensa</i> , <i>A. lateriticola</i> , <i>A. pulchella</i> , <i>A. stenoptera</i> , <i>A. urophylla</i> , <i>Bossiaea aqu</i>
Indirect. "...the anti-fungal activity against the pathogen mainly originates from the	<i>Streptomyces halstedii</i> AJ-7 culture broth
unknown	<i>Paenibacillus illinoisensis</i> KJA-424
in vitro based seedling assay. In vivo greenhouse assay.	Fluorescent pseudomonads isolated from red pepper rhizosphere.
unknown	<i>Trichoderma harzianum</i> + <i>Streptomyces rochei</i>
unknown	<i>Bacillus subtilis</i> isolated from the rhizosphere of healthy Red Pepper plants growing in <i>P. capsici</i> infected soil
unknown	"Bacteria isolated from rhizosphere soils, root surfaces, and root interiors of cucumber, pepper and tomato plants" 439 isolated, 16 selected
unknown	Ten promising fungi selected through a series of selective screenings. <i>Fusarium oxysporum</i> , <i>Microsphaeropsis</i> sp. <i>Oidiodendron</i> sp. <i>Paenibacillus</i> sp.
Suggested antibiosis.	<i>Paenibacillus polymyxa</i> and <i>Bacillus subtilis</i>
Potential induction of plant defenses.	<i>Trichoderma asperellum</i> T34
N/A	Commercial AMF products
Indirect. Surfactant production	Mostly <i>Pseudomonas fluorescens</i>
unknown	<i>Bacillus subtilis</i> AR12, <i>Bacillus subtilis</i> SM21 and <i>Chryseobacterium</i> sp. R89
unknown	<i>Trichoderma asperellum</i> PR11 with a novel oil dispersion formulation
Direct mycoparasitism	12 <i>Trichoderma asperellum</i> isolates. 2 <i>T. virens</i> . Plus <i>T. koningiopsis</i> and <i>T. martiale</i> .
unknown	3X <i>Trichoderma</i> spp isolated from crop rhizosphere
Direct mycoparasitism	<i>Chaetomium globosum</i> CG05, <i>Chaetomium lucknowense</i> CL01, <i>Chaetomium cupreum</i> CC3003
unknown	<i>Chaetomium globosum</i> , <i>Chaetomium cupreum</i> , <i>Chaetomium lucknowense</i>
unknown	<i>Trichoderma saturnisporum</i>
Direct mycoparasitism	<i>Trichoderma harzianum</i>
Molecular, direct. Hypothesized cell wall interference/degradation. Gen	<i>Trichoderma</i> - Extracted metabolites
No hypothesis proposed	Actinomycetes/Streptomyces
unknown	10 native <i>Trichoderma</i> isolates. Six were 99% identical to <i>T. asperellum</i> , the other four were 99% identical to <i>T. harzianum</i> .
unknown	76 bacteria were isolated, 23 were selected for further analysis. The strong antagonistic isolate was further characterized and identified
Direct mycoparasitism	<i>Syringa oblata</i> essential oil. Primary constituent: eugenol.
unknown	<i>Bacillus subtilis</i> (Serenade ASO)
Indirect. Stimulation of hydrogen peroxide activity and callose deposition	<i>Bacillus altitudinis</i> JSCX-1
Indirect. Antibiotic phenazine-1-carboxylic acid (PCA).	<i>Pseudomonas fluorescens</i> LBUM636
No hypothesis proposed	<i>Trichoderma asperellum</i> T36, <i>Trichoderma asperellum</i> T50, <i>Trichoderma harzianum</i> T78
unknown	AMF "Cerro del Metate Consortium. What this contains isn't described. + 4 X Actinomycetes.
unknown	Compost amended with <i>Trichoderma harzianum</i> + <i>Trichoderma asperellum</i>
Potential stimulation of plant defense mechanisms and metabolites by chitin	Chitosan and/or snail shells
Mycoparasitism. Tested whether <i>P. megakarya</i> could be recovered from	<i>Trichoderma asperellum</i> PR10, PR11, PR12, PR659-7
Direct mycoparasitism	<i>Saccharicola</i> sp.
Direct mycoparasitism	<i>Trichoderma viride</i> and <i>Botryosphaeria quercum</i>
Not stated	<i>Trichoderma asperellum</i> 04-22
unknown	Melatonin
Indirect	<i>Rhizophagus irregularis</i> (AMF)
Indirect	Various bacteria isolated from healthy soybean roots. Four isolates, S1, S9, S10 and S11. Seed coat inoculum. S1- <i>Paenibacillus</i> , S9-10-
unknown	Compost / Compost Extract
Indirect	12 host derived fungal endophytes. Ascomycetes. <i>Phoma eupatorii</i> identified as most effective. <i>Pyrenochaeta cava</i> (85% identity) <i>Mo</i>
Ruled out that it's unlikely due to swarming motility, HCN production, virulence	Endophytic bacteria from <i>Smilax bona-nox</i> . <i>Pseudomonas</i> sp.
Suggested role of Acetoin and Diacetyl production as well as Ribonucleoside	169 cucurbit bacterial seed endophytes. Mostly <i>Bacillus</i> , some <i>Paenibacillus</i> , <i>Enterobacteriaceae</i> , <i>Cronobacter</i> , <i>Pantoea</i> , <i>Microbacter</i>
Production of diffusible and volatile compounds by A8a.	Avocado tree rhizosphere sampling. <i>Bacillus</i> sp. A8a
Not stated.	Endophytes - <i>Nigrospora sphaerica</i> A22F1
unknown	<i>Trichoderma harzianum</i> , <i>T. viride</i> , <i>T. reesei</i>
unknown	<i>Trichoderma asperellum</i> PR11
Phytophthora parasitisation by Trichoderma	<i>Trichoderma harzianum</i> Th-7, <i>Trichoderma koningiopsis</i> Tk NRRL50190, <i>Trichoderma asperellum</i> Ta NRRL50191
Possibly due to production of siderophores, salicylic acid and chitinases.	Bacteria isolated from compost, then screened for chitinolytic activity. <i>Geobacillus thermodenitrificans</i> 3750 and <i>Bacillus aerius</i> 3358
unknown	Root nodule isolated bacteria. Identified as <i>Enterobacter</i> spp and <i>Serratia</i> spp
Phosphate-solubilising and plant growth-promoting rhizobacterium. "sh	<i>Chryseobacterium</i> sp. ISE14
Identified the two neolignans honokiol and magnolol as main active compounds	<i>Magnolia officinalis</i> var. <i>biloba</i> bark
Mycelium lysis	<i>Trichoderma harzianum</i>
Competition through iron acquisition by siderophores. "...suggesting diversity	330 Pseudomonads from soil and fresh water
"The mode of action for most <i>T. asperellum</i> isolates and isolate 04-22 is	<i>Trichoderma asperellum</i> 04-22
Regulation of stomatal Opening and SA-JA-ET-signalling pathways are essential	<i>Bacillus amyloliquefaciens</i> FZB42
unknown	<i>Streptomyces</i>

IMPACTS

"*Acacia pulchella*, *A stenoptera*, *A. extensa*, *A. alata* are species that have a high potential for biological control of *P. cinnamomi* ." These *Acacia* species reduced the inoculum level within soils.

"The present results suggest that the seedling assay can be used as a rapid and more accurate technique than detached leaves assay for selecting effective antagonists against soil bore infection of *P. capsici* in pepper."

Combined BCA result of ~75%+ inhibition. "The main conclusion is that the antagonists, *T. harzianum* and *S. rochei*, despite belonging to different genera, are synergic and can be added together to produce a greater effect on the pathogen."

"Interestingly the isolates R13, R19 R36 and R41 exhibited less inhibition in dual culture assay, and were more efficient in controlling the disease severity under in vivo conditions."

lected through sequential selection protocol

T. harzianum noted as particularly effective. "In general the bacterial and actinomycete isolates performed poorly compared with the fungal isolates." However "*Flavobacterium* sp. B219 provided the best overall control of *P. cactorum* on rootstocks."

Examined the CFU count versus the label count. Found 9.9X10 to the 7 and 1.3X 10 to the 8, compared to the stated 1X10 to the seven and 5X 10 to the 6. The products contained the stated organisms.

Effective as a preventative in the soil prior to inoculation, but also effective when co inoculated with *P. capsici*.

11 AMF fungi declared within the inoculants by producer. 13 AMF spore's were recovered and identified. Five of which were not listed as part of the commercial inoculants. "..there were few matches between claimed and trapped species. In the non-inoculated pot treatment no AMF spores were detected."

Biocontrol of *P. capsici* with consortia was much more effective than control using any of the three species individually. 81.81% efficacy compared to 60.73% for a solo.

Good shelf life stability, unique formulation. Good field results. Sprayed trees'/pods had strong resistance to *P. megakarya*. 90% protection within a week of treatment. 50% effectiveness after 3.2 weeks. "When sprayed in the field on cacao tree clones highly sensitive to *P. megakarya*, the formulation performed well."

"Results from this study demonstrated that some of the isolates tested have the capacity to remediate soil infested with *P. ramorum* by eliminating or significantly reducing viable *P. ramorum* propagules."

"Approximately 300 g of dry biomass of *Chaetomium* species will yield approximately 20 g of crude MeOH [12]. In contrast, a single PDA plate harbouring 4-wk-old *C.globosum* yields hundreds of millions of spores [26]. Thus, mixing of spores from these antagonists with potting mediato control root rot in pomegranate."

Investigation into inhibition of sporangial production.

"Extracts caused significant morphological changes in *Phytophthora* hyphae, including swelling, knotting, crumpling, flattening, shrivelling, bursting and necrosis"

Inhibition ranging from 49% to 98%

identified as *Bacillus amyloliquefaciens*

"..the eugenol emulsion as a natural pesticide has no residues and is environmentally friendly..." Sp. Residues.

Chitosan and snail shell increased germination rate significantly. "This study shows that the incidence of disease was significantly reduced in plants obtained from soils treated with chitosan or snail shell. Under controlled conditions, chitosan and snail shell we efficient elicitors of some defense reactions in cotton."

"...*T. asperellum* isolate 04-22 does not only protect *V. tinus* roots from *P. ramorum* infection, but it can reduce secondary inoculum from already infected roots."

"...exogenous application of melatonin significantly attenuated the potato late blight by inhibiting mycelial growth, changing cell ultrastructure, reducing the virulence and impairing stress tolerance of *P. infestans*. Importantly, melatonin reduced the doses and enhanced the effects of fungicide for potato late blight control."

50% inhibition

Potentially plant growth promoting as well.

nosporascus ibericus (97% identity)

"Of the forty tested isolates, twelve displayed significant activity against the tested fungi (data not shown). " " ...only two *Pseudomonas* isolates were the most active against ...isolates of *P. parasitica*" " These four isolates also displayed comparable antimicrobial activity against four additional *Phytophthora* species."

A particular cultivar of Melon gave rise to the highest count of endophytic bacteria that showed protective effects.

identified as most promising.

Identification of *T. harzianum* within the host plants "...the biological control agent entered into the epidermis and cortex region of root tissue. Mycelium and dark round spores of *T. harzianum* were seen in those regions."

"Overall, *P. sojae* was the most susceptible and was inhibited by 103 bacterial strains." "Significantly, there were more aquatic than soil isolates that were antagonistic..."

"Applying FZB42 to the roots of *N. benthamiana* plants reduced the severity of the disease caused by *P. nicotianae* and inhibited proliferation of the pathogen in the leaves, even though *B. amyloliquefaciens* FZB42 only colonizes the roots."

SUCCESS

Yes

"The broth of *S. halstedii* AJ-7 suppressed the growth of *Phytophthora capsici* with less than 1% survival of the pathogen after 12 h treatment."

Dual culture in vivo results showed that inoculation with *P. illinoensis* gave similar plant biomass results as the negative water control, a significant difference compared to the reduction in plant biomass from inoculation with *P. capsici*.

Positive results in all assay undertaken, however these results were not consistent within isolates tested. "In conclusion, the isolate PS119 have proved to be efficient in the control of *Phytophthora* blight of pepper in the in vivo biocontrol assay..."

Yes

Positive results in all assay undertaken, however these results were not consistent within isolates tested.

"In conclusion, the antagonistic bacterial strains selected through the sequential screening procedure appeared to provide significant protection against the soilborne oomycete pathogen, *P. capsici*, through pepper root colonization."

Yes

"The microbial fungicides examined in our study showed no significant reduction of the pepper disease caused by *P. capsici*, compared to the inoculated control. " "MAP (*P. polymyxa*) was effective prominently against zoospore germination, while MBB (*B. subtilis*) only was effective against mycelia growth of

Growth Chamber, 71% reduction in disease. Greenhouse, ~40-50% reduction in disease severity.

"Inoculation of commercial mycorrhizal products did not allow significant total dry biomass increases of maize plant compared to control treatment."

Yes. Greenhouse results = 48.4% - 61.3% disease control. Application in conjunction with olive oil showed significant improvement of disease control. Up to 81.1% control.

Yes

Yes.

Yes. Strong results in dual culture assay.

Yes, the study didn't present all the results in regards to effectiveness. However they do state that eight of the strains showed at least 50% inhibition.

~50-70% reduction in growth rate in in vitro.

Yes. ~50-60% inhibition. >92% sporangium inhibition. "All the tested crude extracts exhibited stronger inhibitory effects on sporangium formation than on mycelial growth..."

Yes >80% inhibition. *T. saturnisporum* significantly reduced plant mortality and disease severity compared to water controls

Dual culture = 30 - 60% inhibition. Disease severity was significantly reduced in greenhouse trials, by more than half reduction in some. Field trials "four *Trichoderma* isolates significantly reduced disease severity in potato plants compared to the control during field trials." Results show disease reduction by h

Yes, 8 *Trichoderma* isolates showed 100% inhibitory activity

Low level minimization of root infection

Yes

77.72% disease control in *in vivo* experiment.

~60% - 100% inhibition.

"It has been found that *B. subtilis* has the potential to protect against *P. infestans* when it was applied as preventative treatments, in field conditions the protective effect occurs only after 6 treatments and is comparable to that with copper."

Yes, ~ 50-60% disease inhibition. "*B. altitudinis* JSCX-1 isolated from a healthy soybean rhizosphere triggered plant resistance against *P. sojae* by an SA-dependent signalling pathway."

Yes, not quantified as a percentage.

Yes, from 77.7% to 81.2% inhibition in dual culture experiment. Somewhat good results in in vivo

Somewhat.

Moderate success, fewer dead seedlings when grown in amended compost. However the results do not seem large.

Yes

Yes, at least 50% reduction of disease

Yes. Inhibition of 44.8% of *P. capsici*. In vitro. Greenhouse test was a failure, with 100% mortality

Yes, strong biocontrol of *P. palmivora* with *B. quercum*, with a biological control index value of 82.3%

Yes.

Yes

Low

Promising. S1 and S11 showed a 70% and 50% disease reduction on plates. Both allowed for a disease reduction in greenhouse trials.

Some. Up to 78% suppression.

"The presence of *Pho. eupatorii* not only reduced or inhibited the pathogen's growth, but perhaps entirely prevented infection."

More than 80% inhibition of mycelia.

Some suppression identified.

46% - 76% mycelial growth inhibition by A8a

Yes, ~40 - 60% reduction in disease severity.

In vitro - ~40-80% inhibition. Greenhouse trials ~10-20 reduction in severity in already infected plants.

"The work presented here shows that, although soil applications with *T. asperellum* PR11 and *Ridomil Gold* did not significantly reduce the total number of diseased pods, nor overall pod rot rate, soil applications are capable of changing disease dynamics by reducing the speed in which the disease progresses"

Minor reduction in growth rate.

Minimal success in In vivo

Serratia were able to inhibit fungal growth. No data given about percentage inhibition or effectiveness.

Yes, 50% reduction

Yes

Yes.

Yes

Soil remediation: Spring success, fall failure

Yes, 60% inhibition

NOTES

Study investigatin whether legume plants may be used to remediate area's and potentially restrict spread or reduce the pathogen load in soils due to resistance.

Assessing culture broth of *S. halstedii* as a BCA

Investigated the plant defense proteins upregulated in response to infection.

Investigating using two BCA as a single formulation

Sequential selection protocol. Lengthy article with a good amount of data and statistics.

Screening 624 BCAs. 504 fungi and 120 bacteria and actinomycetes. Samples isolated from apple orchard sites and some non-orchard sites in Auckland, Hawke's Bay and Nelson. This was narrowed down to

Examining the effectiveness of two commercial BCA, each containing one of *Paenibacillus polymyxa* and *Bacillus subtilis*

Molecular focused

This article is assessing the composition and effectiveness of commercial AMF inocula and whether it might establish in soil.

Screened 101 isolates obtained from rhizosphere, 24 showed inhibition of *P. capsici*, 15 of these inhibited by more than 50%.

Study explores a mixed BCA consortium as BC of *P. capsici* but also as BC of a mix of pathogens: *R. solanacearum*, *P. capsici* and *M. incognita*

Investigating a novel oil based *T. asperellum* formulation. Assessed shelf life.

This study spent more time characterizing the *Trichoderma* growth profiles rather than the inhibitory effects.

Generally solid article, the controls could have been better but otherwise seems decently put together. Crude extracts of *Chaetomium* sp.'s were also tested.

Measured sporangial production inhibition

Exploration of a new *Trichoderma* species. *T. saturnisporum*. Investigation into inhibition effects as well as volatile compounds produced.

In Vitro, Glasshouse then Field Trial.

Detailed molecular analysis, including gene expression data for both Host and Pathogen

Dodgy methodology. Lots of uncontrolled variables. Article largely focuses on growth promotion and characterization of microbes, less on inhibition.

Fairly simple study characterizing the control effectiveness of native *Trichoderma* strains.

Study investigating a plant derived compound: Eugenol.

Trial of commercial BCA, one which is used here in NZ.

Molecular methods and good experimental design showed that PCA was the main causative agent in protection.

Short succinct article.

Somewhat confusingly written in general. The study wasn't particularly well designed either.

Assessing compost amended with different *Trichoderma* sp. as a means to control *Phytophthora* blight.

Interesting study investigating seed coat BCA.

Precursor study to the 2018 study. Repeat application had no effect. Propagule type played a large role, chlamydospores more infective than sporangium. Secondary drench appears effective.

Exploring how Melatonin acts as a biocontrol agent. Exploration of the host transcriptome in response to melatonin.

Simple article but clear and concise

This study focuses on the potential of compost to be used in bio-control. The results are primarily that Compost is complicated and full of variables. Not overly convincing.

Some of the methodology reasoning is poorly explained. Anthocyanin assessed in response to recognition that inoculated plants with *P. eupatorii* were presenting darker leaves.

Studying investigating whether an invasive weed plant might harbour endophytic bacteria useful for biocontrol purposes. Excellent methodology delving into the actual mechanisms behind the biological control.

General article looking at endophytes from Curcubits.

GC-MS used to identify volatile compounds produced by A8a.

Succinct article. SEM used to visualize the BC/Pathogen interaction.

Study is primarily investigating compost and it's role in reducing phythopathogenic agents within the compost.

This study was only tangentially interested in the biological control of phytophthora.

The methods are a bit unusual and are somewhat worrying. Transcriptomics component.

Study was broadly focused on three pathogens, not just *Phytophthora*.

The written English is somewhat broken and numerous words are misused.

Genome sequenced for the most effective organism, *Pseudomonas* 06c 126 embank accession SAMN05727803

This study aimed to test a patented biological control agent in an actual field trial.

Investigating the molecular mechanisms of triggered defense from the plant side. Well constructed experimental design and statistical analysis.