



Microbial biodiversity for practical green agricultural development

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Content

- Culture collection management at VTCC
- Research activity:
 - Bio-products for agricultural application
 - Bioactive compound screening



Culture collection management at VTCC

Main activities

- Collecting and isolating microbes from available sources
- Screening and selecting the valuable isolates
- Taxonomical research
- Reservation
- Documentation
- Servicing : identification, distribution, analysing and other related bioassays

Quality control

- Viability
- Purity
- Identity

Performed as guidelines by WFCC and OECD documents





VTCC cultures

Microbes	years								
	2004	2005	2006	2007	2008	2009	2010	2011	2012
Aerobic bacteria	500	552	612	700	900	1013	1660	1798	1873
Anaerobic bacteria	-	-	-	-	-	50	50	50	50
Actinomycetes	425	500	1023	1634	2108	3050	3050	3150	3247
Yeast	381	470	523	643	780	920	1020	1113	1292
Filamentous fungi	700	1314	1723	2123	2681	2500	2500	2500	2750
Mushroom	30	46	78	126	180	235	280	315	315
Micro-algae	25	34	54	64	78	83	96	115	115
Celllines	18	20	21	21	24	28	28	28	28
Total	2079	2936	4034	5311	6727	7879	8684	9069	9670



Research activities

Bio-products for agricultural application

- Enzymes for feed
- Probiotic
- Chitosan oligomer as biocontrol
- Enviromental pollution treatment

Bioactive compound (BC) screening

- BC against *Xanthomonas*
- BC against Foot and Mouth Virus
- Construction of BC library



Agricultural applications

Screening enzymes producers



Amylase



CMCase



Xylanase



Protease

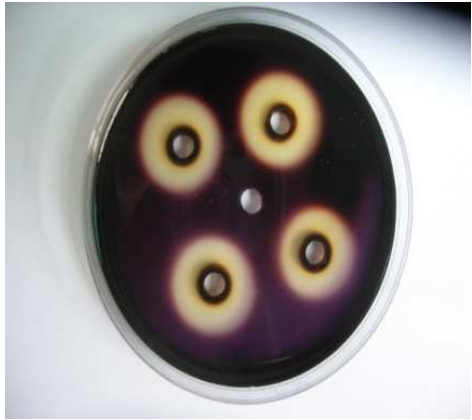


Phytase



Bacteriocin activity

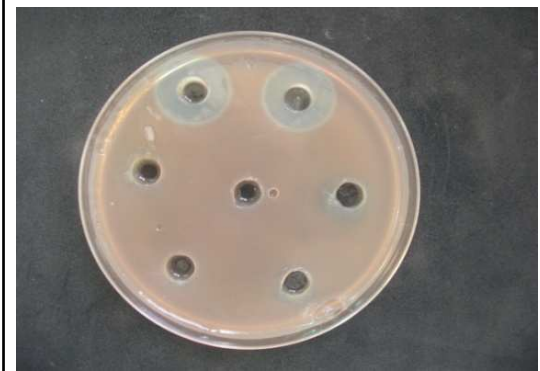
SCREENING PROBIOTIC CULTURES FOR ANIMAL FEED



Amylase activities



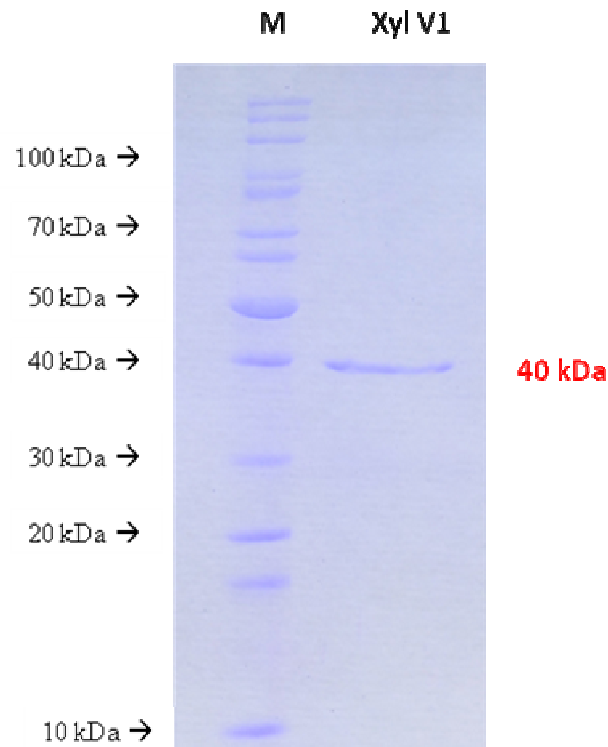
Cellulase activities



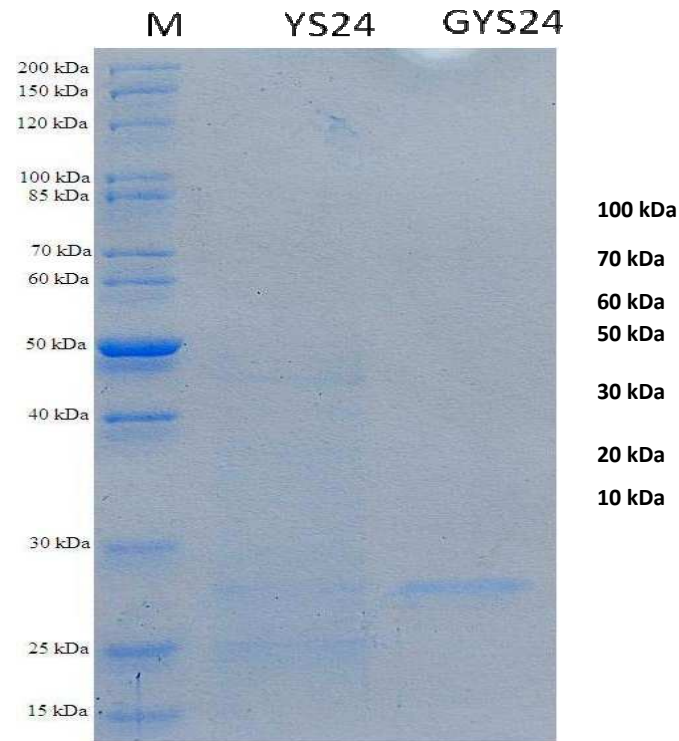
Bacteriocin activities



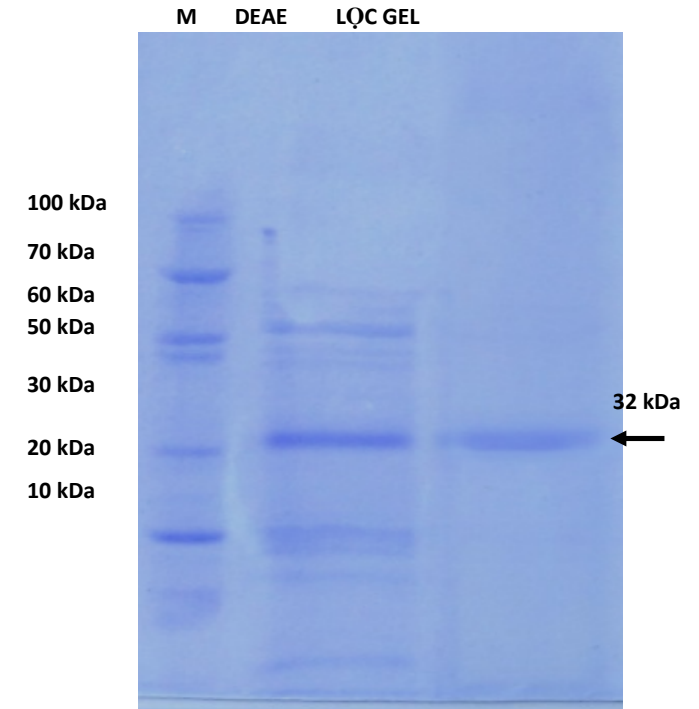
Study on Xylanase, Protease and Phytase from VTCC cultures



Xylanase from *B. amyloliquefaciens* subsp. *plantarum* SP 1901



Protease from *B. subtilis* subsp. *subtilis* YS24



Phytase from *B. amyloliquefaciens* subsp. *plantarum* SP 1901

Biomass production for probiotic



Fermentation

Centrifugation

Adding carrier

Spraying-Drier

For *Bacillus*



Freez-Drier

For *Lactobacillus*



Product



TEST ON PIGLETS

Indicators	Negative	Positive	Experiment	Compare Exp/Neg
Growth rate (g/pc/d)	396	454	462	Increased (16.7%)
Yield (g feed/g of weight)	1.53	1.39	1.42	Reduced by 7.2%
Diarrhea rate (case)	254	135	175	Reduced by 31%

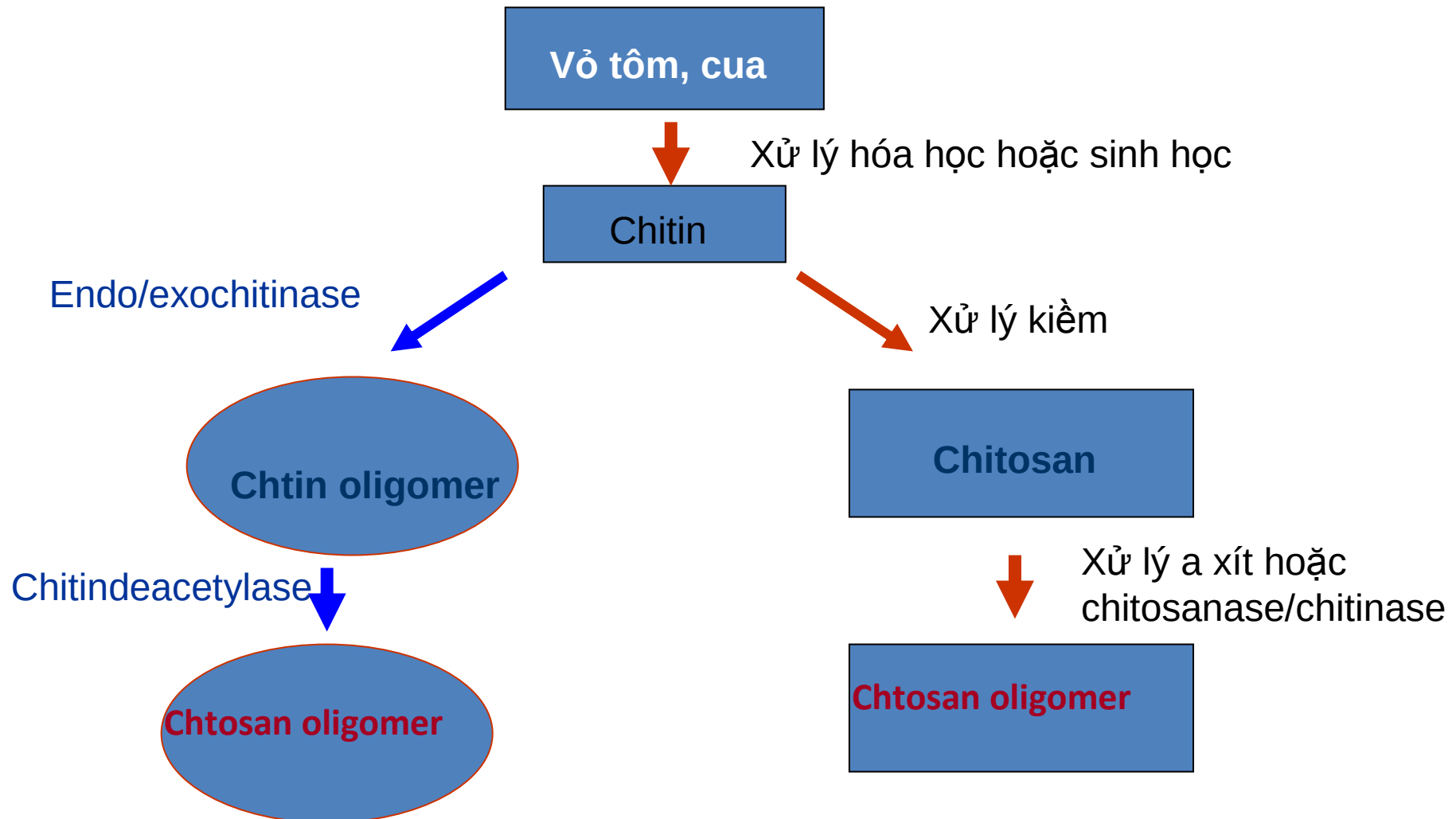
Piglets: 21 days age/weight: 7-8 kg. 24 pcs/case

Experiment duration: 50 days

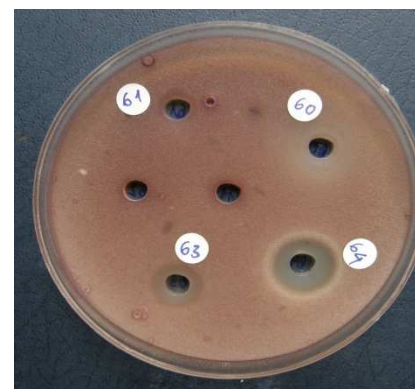
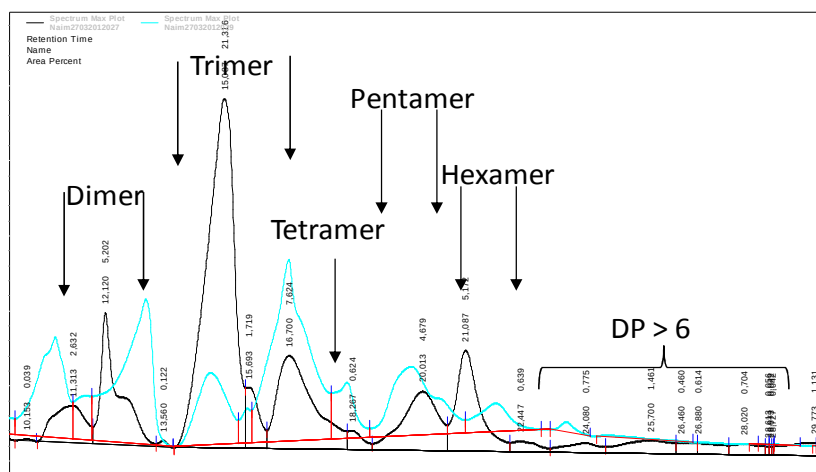
Negative: feed without probiotic or antibiotic addition

Positive: feed with antibiotic

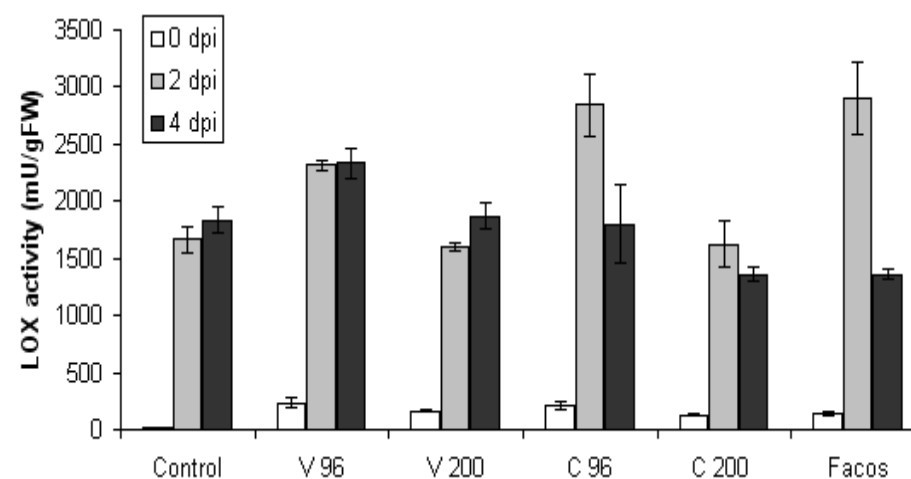
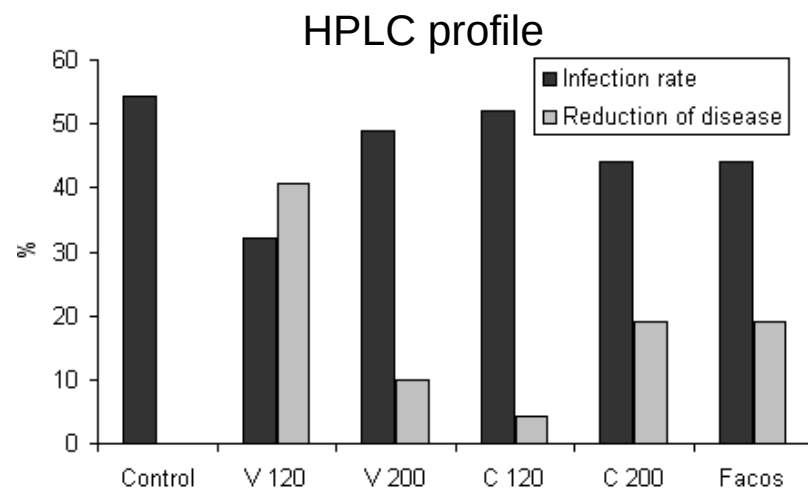
Sản xuất chitin/chitosan oligomer/*Chitooligo*)



Analysis and biocontrol activities



Inhibition to *Fusarium* & *Ralstonia*



Inhibition to *Botrytis cineria* tại

Increase expressing of LOX(lipoxygenase)



Field trial on some vegetables

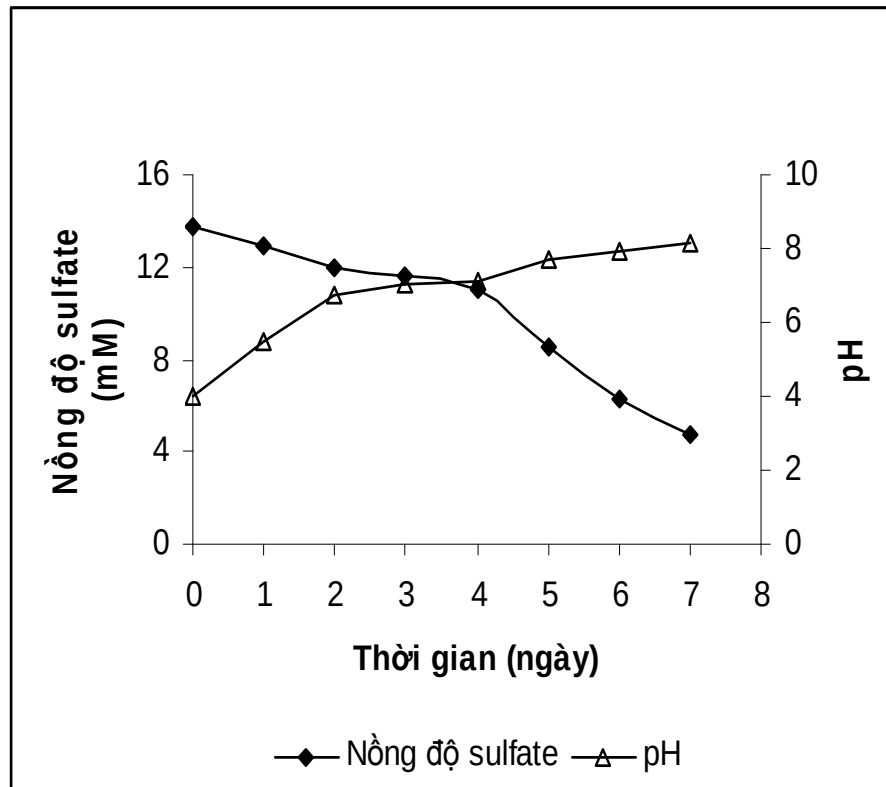
Vegetables	diseases	Biocontrol agents	Treatments	Inhibition rate (%)
Tomato	Fusarium	Vilidacin	5 ngày/lần	46,05
		Chitosan oligomers	Tưới gốc + phun lá /15 ngày /lần	89,47
	Ralstonia	Kasugamycin	7 ngày/lần	43,75
		Chitosan oligomers	Tưới gốc + phun lá /15 ngày /lần	80,00
	Phytophthora	Boodo và Ridomin	7 ngày/lần luân phiên	74,40
		Chitosan oligomers	Tưới gốc + phun lá /15 ngày /lần	59,50
cucumber	Fusarium	Vilidacin	5 ngày/lần	46,34
		Chitosan oligomers	Tưới gốc + phun lá /15 ngày /lần	81,71

AMD TREATMENT BY USING SULFATE-REDUCING BACTERIA (SRB)

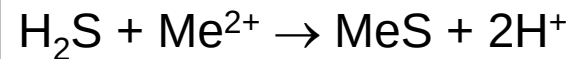
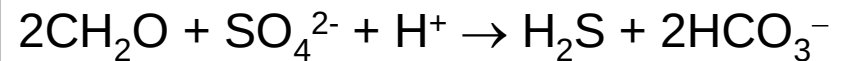


Tank 1	Tank 2	Tank 3
AMD from Trangkhe coalmine pH 4 $[\text{Fe}] = 200 \text{ mg/L}$ $[\text{SO}_4^{2-}] = 1320 \text{ mg/L}$	- Lime stone + wood chips - Organic waste from a poultry farm (final COD = $320 \text{ mg O}_2/\text{ml}$) - <i>Desulfovibrio</i> spp were added as seeding.	Effluent

AMD TREATMENT BY USING SULFATE-REDUCING BACTERIA (SRB)



Sulfate-reducing bacteria

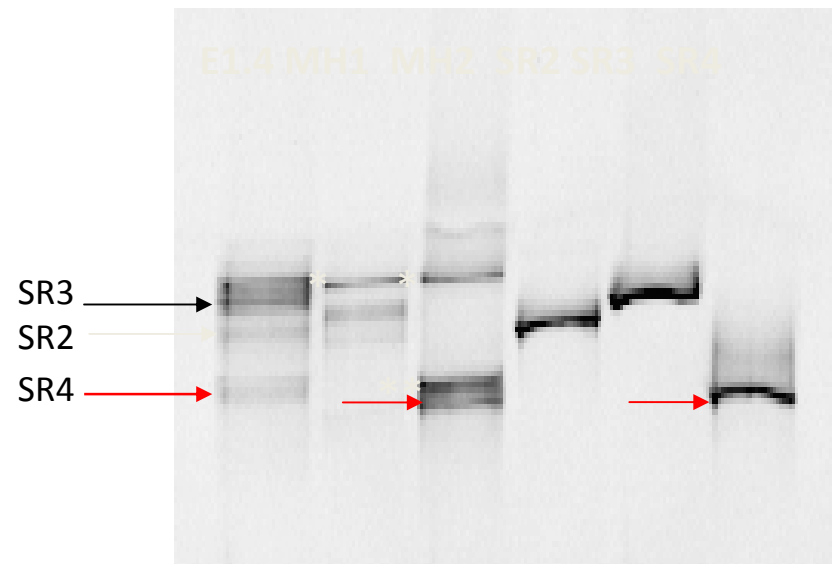


After 7 days of treatment:

- ✓ pH 4 increased to 8,2
- ✓ Fe(II) concentration reduced from 200 mg/L to 36 mg/L.
- ✓ Sulfate concentration reduced from 13,75 mM (1320 mg/L) to 4,5 mM (432 mg/L).

→ Co-treatment of AMD and organic-rich wastewater could be performed with a high efficiency.

DGGE analysis



SR2: *Desulfomicrobium* sp.

SR3: *Desulfobulbus* sp.

SR4: *Desulfovibrio* sp.



Bioactive compound (BC) screening

Screening BC for controlling rice blight disease by *Xanthomonas*.

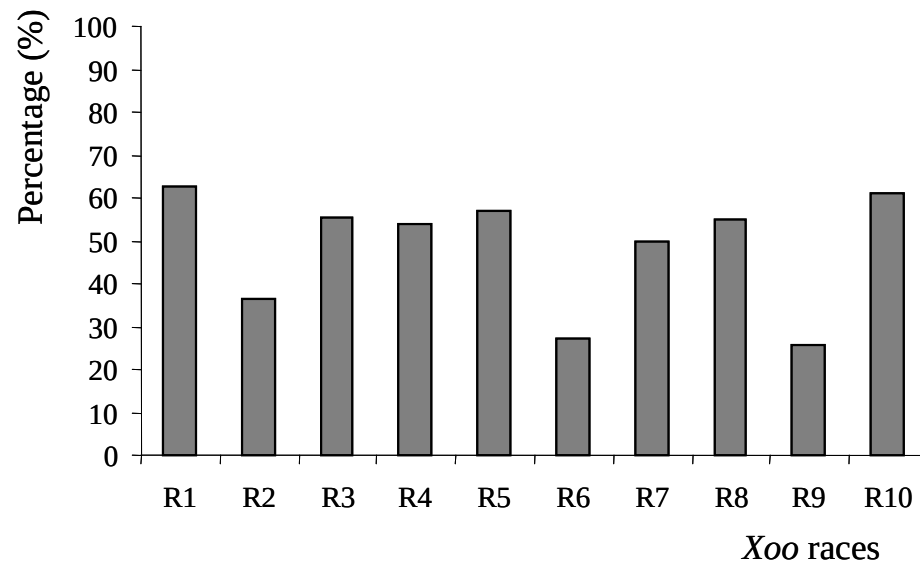
- Bacterial blight (BB)





Screening for actinomycete isolates capable of inhibiting Xoo races In Vitro

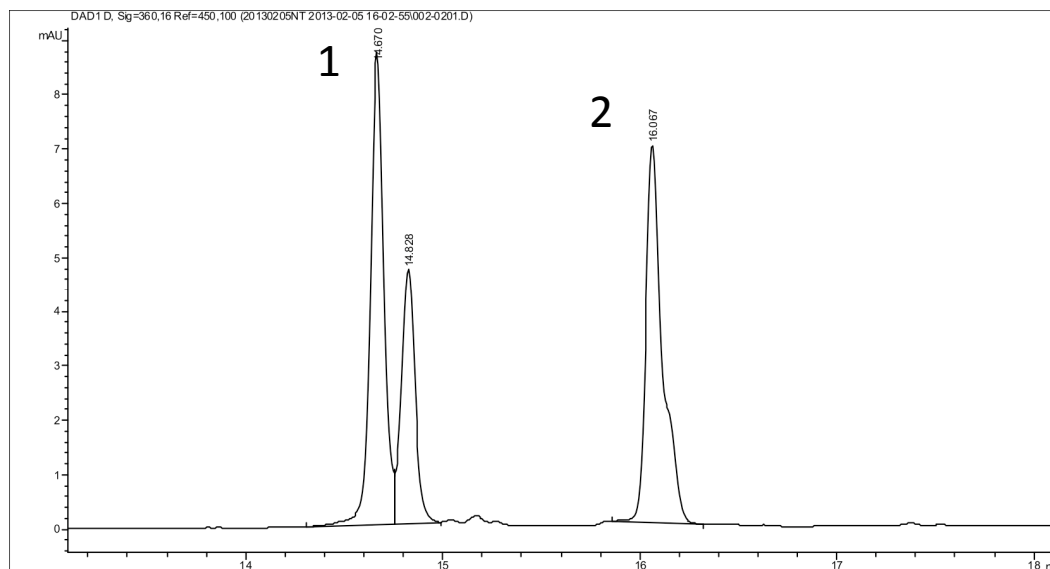
-A total of 17 strains (10.2%) was found to be able to inhibit all 10 Xoo races.



⚙ R9, R6, and R2 races were more difficult to inhibit than the others

Figure 3. Inhibition pattern of actinomycete strains

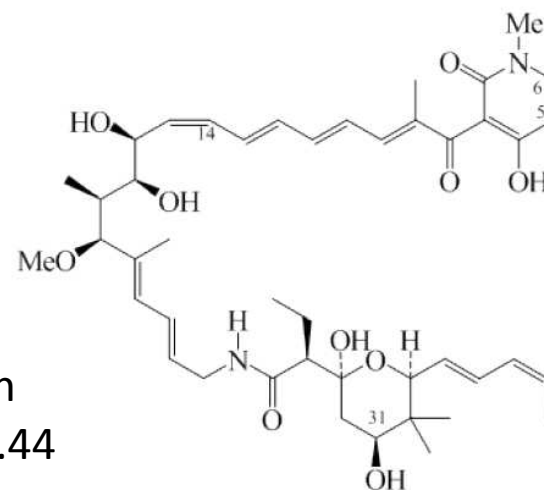
Bioactive compounds from VN-08-A12



Compound 1: MW = 778.43

Compound 2: MW = 778.43

Factumycin
MW = 778.44

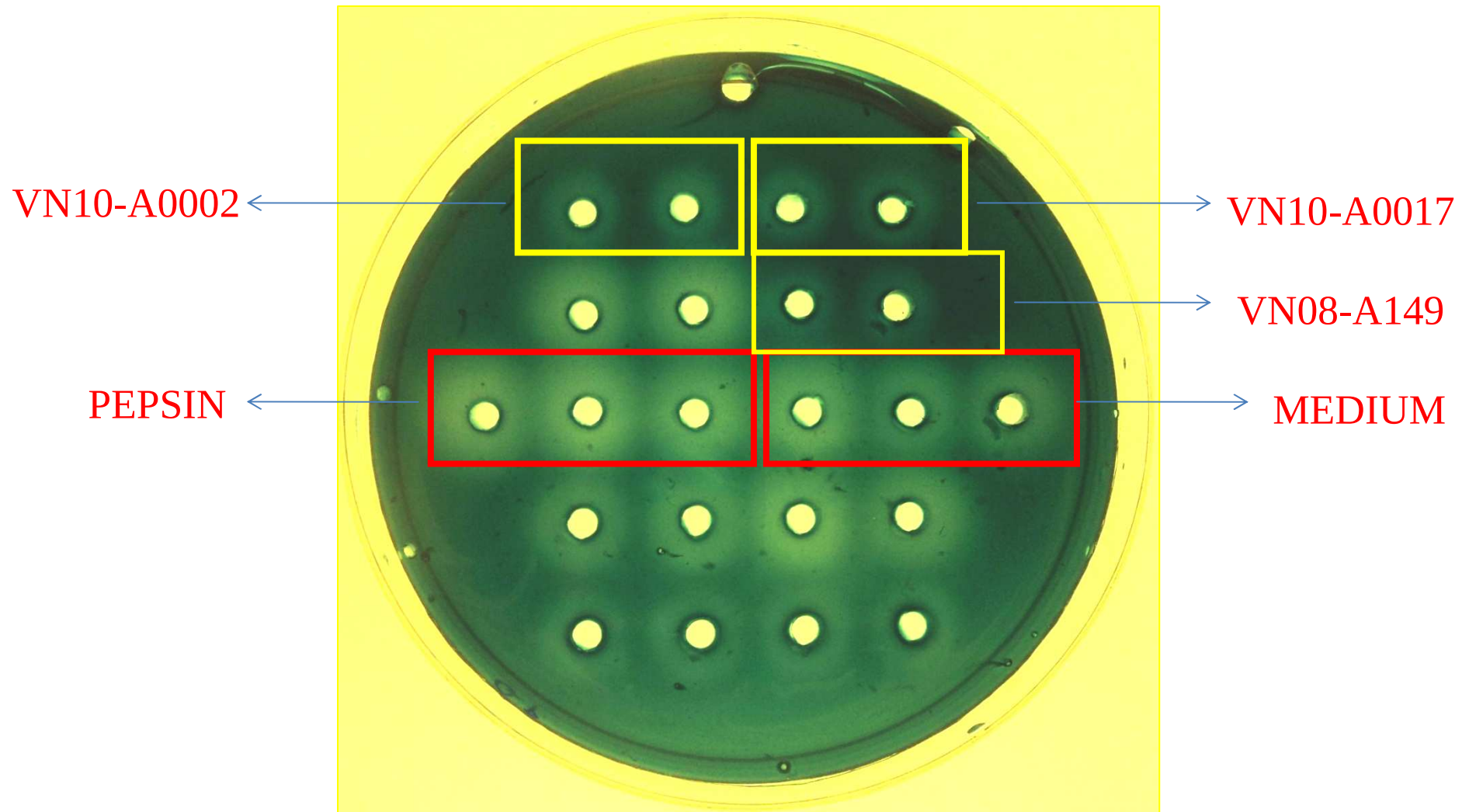




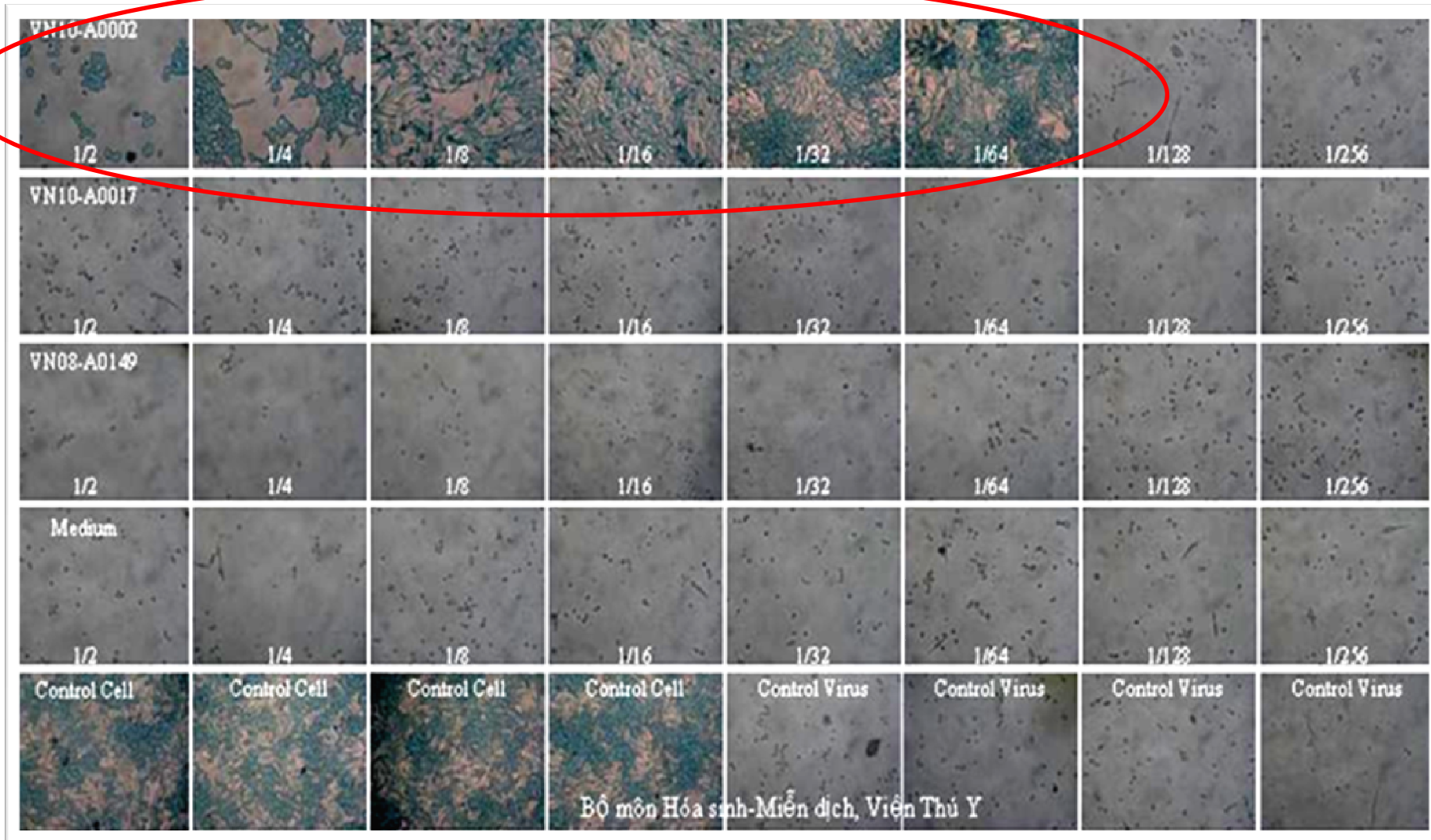
Antivirus

- Viral protease inhibition
- Protecting cell line (BHK- 21) from Foot Mouth virus

PROTEASE INHIBITOR ACTIVITY



INHIBITION OF THE GROWTH OF VIRUS CAUSING FOOT AND MOUTH DISEASES



Using virus neutralization test on BHK- 21 cell line



Thank you for attention!