

( )

**(*Citrus nobilis* × *Citrus deliciosa*)**

\*  
" "  
(NRL)  
(I.A.R.I.)  
( // : // : )

*Glomus manihotis*, *Gigaspora gigantean*, *Glomus mosseae*

Gigaspora Glomus

DNA VAGIGA VAGLO VANS1, NS21, NS61

Glomus

VAGLO

VANS1

*G. manihotis* *G. mosseae*

( ) *G. gigantean*

VANS1-NS61

rRNA

( ) PCR DNA

DNA VANS1-VAGIGA VANS1-VAGLO

(AMF)

AMF

(Usha *et al.*,

AMF (Fortuna *et al.*, 1996) 2004  
 (Helgason *et al.*, 1999; Turnau *et al.*,  
 .2001) (Cruz *et al.*, 2000) (Menge *et al.*,1980)  
 (Sonawane *et al.*, (Declerck *et al.*,1995)  
 ) AMF . 1998)

(Lopez-Aguilion & Mosse, 1987; (Merryweather &  
 .Di Bonito *et al.*, 1995; Van Tuinen *et al.*, 1998) Fitter, 1998)  
 (1995) Di Bonito *et al.*  
*Glomus intraradices* (Sakamoto *et al.*, 2004)

VANS1- NS21 AMF  
 . PCR (Wyss & Bonfonte, 1993; Millner *et al.*,1998;  
 DNA Schubler *et al.*, 2001)  
 AMF

PCR (1997) Edwards *et al.*  
*Glomus mosseae*  
 (2002) Oba *et al.* .  
 PCR- RFLP .(Clapp *et al.*, 1995; Redecker *et al.*, 2003)

*Gigaspora*  
*Scutellospora cerradensis margarita*  
 .  
 18sRNA / kbp . rRNA  
 VANS1 (PCR)  
 NS1 AMF

AMF .(Redecker, 2000)  
*Glomus mosseae Glomus manihotis*  
*Gigaspora gigantean*

DNA (1992) Simon *et al.*  
 PCR

AMF

(I.A.R.I) PCR  
 (Redecker *et al.*, RFLP  
 .1997; Vandenkoornhuyse *et al.*, 2002)

(1995) Di Bonito *et al.* :

CTAB :T<sub>0</sub>  
 ( )

DNA *G. manihotis* + :T<sub>1</sub>

AMF *G. gigantean* + :T<sub>2</sub>

*G. mosseae* + :T<sub>3</sub>

T<sub>3</sub>+T<sub>2</sub>+T<sub>1</sub> + :T<sub>4</sub>

m1 m1

EDTA (14ml) NaCl 5M ( g) CTAB 2%]  
 (5ml) Tris-HCl 1M (5ml) 0.5 M, pH 8.0  
 [(26ml)

( : : )

rpm ( °C)

/ /

°C

AMF

rpm °C

(Phillips & Hayman, 1970)

% DNA mM

(Jalil & Domsch, 1975)

TE μl

DNA

AMF

PCR

DNA

*Gigaspora Glomus*  
 (Simon *et al.*, 1993)

DNA CTAB

	(T <sub>4</sub> T <sub>0</sub> )	(PCR)
	:	(Annealing temperature) DNA
VANS1- NS61		(Reaction mixture)
		20mM Tris-HCl ) (Master mixture)
<i>Glomus Gigaspora</i> rRNA		0.02% /3mM MgCl <sub>2</sub> /100 mM KCl/[pH 8.4]
(1kb )		1.25 U of <i>Taq</i> /200 mM [each] nucleotide/gelatin
VANS1- NS21		( 50 DNA polymerase
550 bp		(Template DNA) DNA μl
	Glomales	μl
	( °C)	(CR-CORBETT RESEARCH model CGI- PCR
PCR		960)
VANS1-VAGLO		°C ) (Denaturation)
Glomus		( °C ) ( °C
( <i>G. manihotis</i> ) T <sub>1</sub>		( °C )
( ) bp	%	PCR
Glomus		TAE
bp	0.1 mgL <sup>-1</sup>	
(Simon <i>et al.</i> ,1993)	(Uvidoc	
		model BTS-20.M)
VANS1-VAGLO		
DNA		
°C		
	<i>G. mosseae</i>	( )
( ) bp		
		(
Glomus	( ) <i>G. mosseae</i> ( ) <i>G. manihotis</i>	
VANS1-VAGIGA	( ) <i>G. gigantean</i>	
<i>Gigaspora</i>		DNA
) T <sub>2</sub> T <sub>4</sub>	DNA	CTAB
<i>G. gigantean</i>		
	( °C	
		DNA

VANS1 ( / °C) NS61 ( / °C)

AMF T<sub>4</sub> DNA

AMF °C 1kb

rRNA DNA

PCR ( °C)

Glomus VAGLO ) DNA (

VANS1 DNA (

VANS1-NS21 bp

*G. mosseae* *G. manihotis* bp

(Simon *et al.*, 1993)

*G. gigantean* (1kb) (T<sub>4</sub>) DNA

Glomus Glomus

VANS1-VAGIGA bp

Simon *et al.* DNA VANS1- VAGIGA (1993)

*G. gigantean* VANS1-NS61

*Glomus Gigaspora* rRNA

kb

DNA ( ) PCR (Morton *et al.*,1993)

VANS1-VAGLO

VANS1-VAGIGA (Frey *et al.*, 1995)

VANS1-NS21 AMF AMF

Simon *et al.* AMF

bp AMF

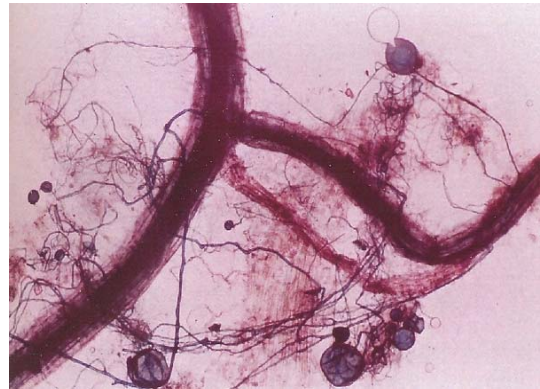
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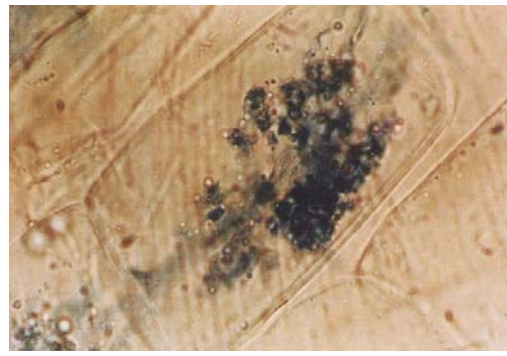
*G. manihotis*  
(× )



(× ) *G. manihotis*

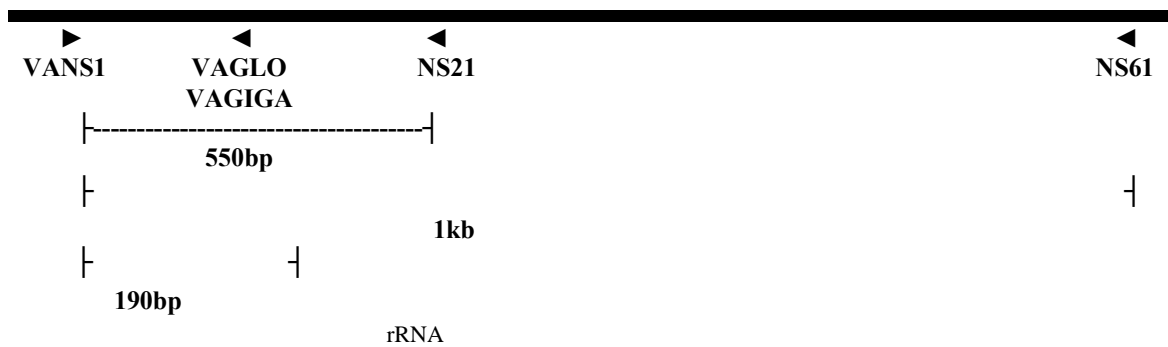


*G. gigantean*  
(× )



*G. mosseae*  
(× )

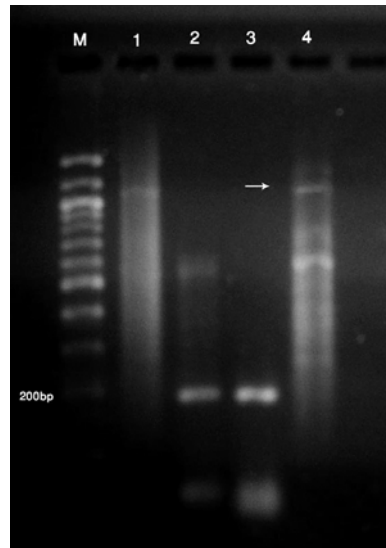
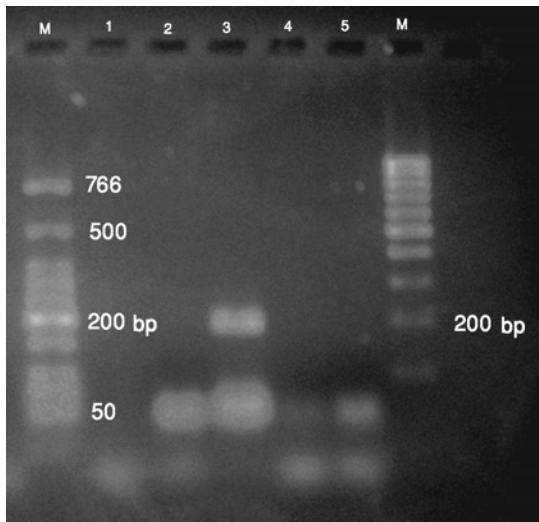
Primer	Sequence
VANS1	5' GTC TAG TAT AAT CGT TAT ACA GG 3'
NS61	5' TCA GTG TAG CGC GCG TGC GGC 3'
NS21	5' AAT ATA CGC TAT TGG AGC TGG 3'
VAGLO	5' CAA GGG AAT CGG TTG CCC GAT 3'
VAGIGA	5' TCA CCA AGG GAA ACC CGA AGG 3'





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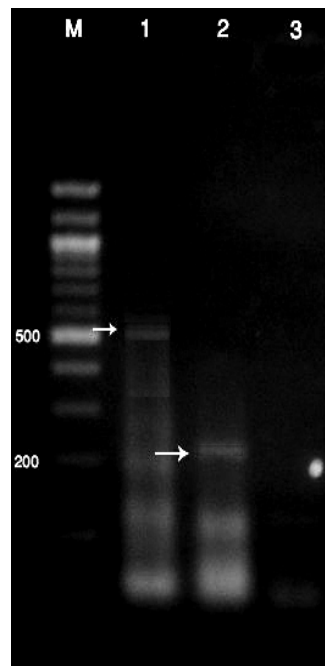
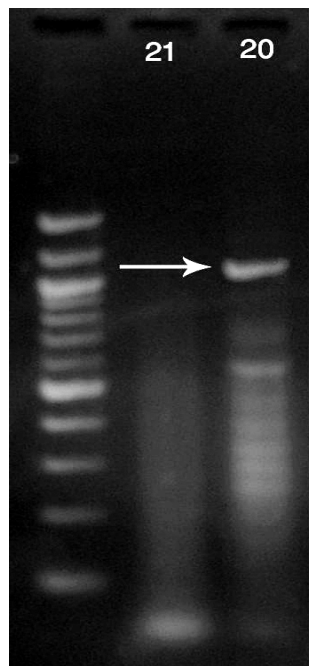


T4 T0 PCR  
VANS1-VAGLO

T4 T0 PCR

T3: T2: T1:  
DNA:M T0: T4:

VANS1-NS61 T0:  
VANS1-VAGLO T1:  
VANS1-VAGLO T3:  
VANS1-NS61 T4:



VANS1-NS61 kb  
VANS1-VAGLO ( ) VANS1-NS21 PCR  
T4 PCR :  
( )  
PCR :  
( ) VANS1-VAGIGA ( ) DNA