





















# PROBES

Earliest microarrays used PCR products of 200-1000 bp amplified from cDNA libraries; labor intensive and prone to error; long probes tolerate mismatches, and lower specificity; must ne denatured prior to hybridization
 Currently typical to use defined synthetic oligonucleotides of 20-70 nt; apply at uniform concentration; no need to denature; terminal modifications and/or spacers can orient the probe on the array, minimize steric hindrance

- MACROARRAYS
  - typically 10's to 100's of probes
  - typically spotted on membranes
  - enzymatic, isotopic, or dye labeling Of
  - sample (target) nucleic acids
  - representative conserved host probes as a control for efficiency of amplification and hybridization
  - probes may be arranged in patterns to allow rapid visual analysis of results

- MICROARRAYS
  - typically 100's to 1000's of probes
  - typically spotted on glass or plastic supports
  - typically fluorescent dye labeling of
  - amplified sample (target) nucleic acids
  - representative conserved host probes as a control for efficiency of amplification and hybridization
  - instrumentation and software required to capture and analyze results

























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<u> </u>	Data Olgo	S T-Predict		1-				Decreasing
	8 8	Uid Genba	nk Record Tide	Taxon			Intensity	intensity
		uid	Genbank R	Taxon info (PlantVirus nuccore 30-2010-12	1 (UP	1 (UP	A 10PMP1 *	
	1	206597709	Jatropha v	Jatropha vellow mosaic India virus -> Bego	102	54616	183	
GenePix scan	2	96141661	Cherry ema	Cherry small circular viroid-like RNA 2 -> Ch	\$1200	40787	50371	
O CHICH IX SCALL	3	166788519	Persimmon	Persimmon viroid -> unclassified viroids -> V	36925	36977	1535	
( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( (	4	56792004	Hydrangea	Tymovirales -> ssRNA positive-strand virus	200	24549	71	
	5	169803200	Lolium laten	Lolium latent virus -> Lolavirus -> Alphaflexi	16	22136	32	
0000000000	6	169803200	Lolum laten	Lolium latent virus -> Lolavirus -> Alphaflexi	0	18525	26	
		236275445	Tomato chi	Tomato chlorobic dwart viroid -> undassite	18860	14091	18174	
		20806004	Plantano ar	Tumovirales ab scBNA positive strand virus	36	12687	40	
	10	73426684	Bean comm	Bean common mosaic necrosis virus -> Poty	21776	9950	18435	
	11	154756937	Pear blister	Pear bister canker viroid -> Apscaviroid ->	10256	9490	11896	
	12	194871987	Cycad leaf	Cycad leaf necrosis virus -> Badnavirus ->	35116	8960	2083	
	13	209978144	Carrot mott	Carrot mottle virus satellite RNA -> UT reda	1274	8502	10012	
	14	90403572	Gremmeniel	Gremmeniella abietina type B RNA virus XL	199	8390	197	
	15	86141661	Cherry sma	Cherry small circular viroid-like RNA 2 -> Ch	9691	8073	10581	
	16	62327433	Mint virus X	Mint virus X -> UT Split Phalus virus X -> Po	450	7906	1246	
	17	23491553	Tulp virus	Tulip virus X -> Potexvirus -> Alphaflexivirid	178	7664	32650	
	18	49487503	Maize fine s	Maize fine streak virus -> Nucleorhabdoviru	40113	7414	57297	
	19	86141656	Cherry sma	Cherry small crcular viroid-like RNA 1 -> Ch	9105	7015	2397	
	20	45535302	Dire vellow	Dire velow mottle virus -> Schemovinus ->	213	6336	722	
	22	14717300	Broad bean	Broad bean wilt virus 2 -> Fabavirus -> Co	8912	5186	1564	
	23	1399881_n	Cassava ve	Cassava vein mosaic virus -> Cavemovirus	1038	5104	1012	
	24	62327433	Mint virus X	Mint virus X -> UT Split Phaius virus X -> Po	8942	4286	24946	
	25	220732251	Rice stripe	Rice stripe necrosis virus -> Viruses -> Root	6054	3756	5137	
Uchip	26	84039734	Ageratum y	Ageratum yellow vein Taiwan virus -> Bego	7157	3550	105	
	27	18138525	Grapevine f	Grapevine fleck virus -> Maculavirus -> Ty	5980	3463	10285	
(Fischer Lab)	28	194473848	Diascia yel	Diascia yellow mottle virus -> Tymovirus ->	12553	3460	173	
(Lischer Lub)	29	189458579	Lettuce vir	Lettuce virus X -> UT Split Scallon virus X	80-49	3399	5600	
	30	164186811	Review verific	Apriad yptowrus -> Parotowruse -> dskruu	3200	3282	4064	
		and the second of						
				Pind			Save as cluster	
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"Family" :: "Genus" :: "Species"	:: "Assi	gned Taxon"	
Bromoviridae Cucumovirus Cucumber mosaic virus-RN	A2 "Bromo	viridae"	
			_
D	E	F AN	
Name	ID	X F532 Median - B532	F
NATINATINATION Plant Seq	Arabidopsis_rbcL	# 65352	
NATINATINATIONTO Plant Seq	Arabidopsis_rbcL.11	# 65343	CMV-intected sample
NAUNALICAL PLAN AUTORNAULA Seguration And A Seguration An	200/594_nt0401.60 Zm 18S rRNA-2	# 65336	
NA::NA::Control Plant Seq	Zm_185_rRNA-2.11	# 65325	Nicotiana benthamia
NATINATIONATIONATIONATIONATIONATIONATION	Zm_185_rRNA-3.11 Zm_5.85_rRNA-1.11	# 65311	
NA::NA::NA::Control Plant Seq	Zm_185_rRNA-4.11	# 65290	
NACINACINAL Control Plant Seg	Zm 255_rRNA-5.11 Zm 255_rRNA-5.11	# 65260	
NA::NA::Control Plant Seq	Zm_18S_rRNA-3	# 65256	All results highlighted in blue
NACINACINACIONTOL Plant Seg	Zm 255_rRNA-6.11 Zm 5.85_rRNA-1	# 65230	about identification as a more
NA::NA::Control Plant Seq	Zm_18S_rRNA-4	# 65198	snow identification as a mer
NA::NA::Control Plant Seg	Zm_255_rRNA-7 Zm_255_rRNA-6	# 65184	of the family Bromoviridae
NA::NA::Control Plant Seq	Zm_25S_rRNA-5	# 65135	of the family bromovindue,
Geminiviridae::Begomovirus::Tomato leaf curl Toliara virus::Tomato leaf curl Toliara virus	154090425_nt0051.60	# 64251	Cucumovirus with probes fo
Bromoviridae::Cucumovirus::Tomato aspermy virus::Cucumovirus	17978215_nt0401.60	# 62634	
Bromoviridae::Cucumovirus::Cucumber mosaic virus segment RNA2::Tomato aspermy virus seqment 2	222039_nt2342.60	# 44569	RNA 1 and RNA 2 of CMV
Bromoviridae::Cucumovirus::Cucumber mosaic virus segment RNA2::Tomato aspermy virus seqment 2	222039_nt2317.60	# 43619	
Bromoviridae::Cucumovirus::Cucumber mosaic virus segment RNA2::Bromoviridae	222039_nt1792.60	# 43306	yielding high responses.
Bromoviridae::Cucumovirus::Tomato aspermy virus::Cucumovirus	7530172_nt1978.60	# 24871	Note also high intensity resu
NA::NA::Control Plant Seq	Nb_Ubiquitin.11	# 22524	Role disc high intensity resu
Bromoviridae::Cucumovirus::Tomato aspermy virus::Cucumovirus	17467151_nt1976.60	# 18901	multiple control plant seque
Bromoviridae::Cucumovirus::Tomato aspermy virus::Cucumovirus	17978215_nt3167.60	# 18179	interipte control plain seque
Bromoviridae::Cucumovirus::Cucumber mosaic virus segment RNA1::Cucumovirus	62867594_nt3176.60	# 14747	Results in red are single pro
Unclassified::Unclassified::Cherry small circular viroid::Cherry small circular viroid-like RNA 2	86141661_nt171.60	# 13970	
Bunyaviridae::Tospovirus::Iris yellow spot virus segment M::Iris yellow spot virus	18157543_nt2401.60	# 13797	for unrelated viruses; some
Pospiviroidae::Pospiviroid::Citrus exocortis viroid::Citrus exocortis Yucatan viroid	226426431_nt276.60	# 8290	specific' probes react per
Potyviridae::Potyvirus::Bean common mosaic necrosis virus::Bean common mosaic necrosis virus	73426684_nt5535.60_rc	# 7646	specific probes react non-
NA::NA::Control Plant Seg	Nb_Ubiquitin	# 6418	specifically to many sample
Bromoviridae::Cucumovirus::Cucumber mosaic virus segment RNA1::Cucumovirus	189514257 nt3140.60	# 5547	ip contean, to man, bumple
Bromoviridae::Cucumovirus::Cucumber mosaic virus segment RNA1::Cucumber mosaic virus	62867594 nt3276.60	# 5547	including 'healthy'
Geminiviridae::Mastrevinis::Maize streak vinis::Maize streak vinis - [Raw]	3892617 nt0826 60 m	# 5020	·
ClerteroviridaevClecterovirvevGranevine leafrell-accoriated virve 2vGranevine leafrell-accoriated virv	P2-A5020204 pt14041 60	# 4593	





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African cassava mosaic v	irus-infe	cted	sampl	e 🔿
D	E	F G H	1	
Name	ID	X Y Dia.F	543 Median F543	
NA::NA::Control Plant Seq	Zm_25S_rRNA-6	** *** **	65535	
NA::NA::Control Plant Seq	Zm_25S_rRNA-6.11	## ### ##	65535	
NA::NA::Control Plant Seq	Zm_255_rRNA-7.11	## ### ##	65535	
Closteroviridae::Closterovirus::Grapevine leafroll-associated virus 2::Grapevine leafrolleafroll	te LR2-AF039204_nt14941.60	** *** **	65535	
NA::NA::NA::Control Plant Seq	Zm_25S_rRNA-7	## ### ##	63748	
NA::NA::Control Plant Seq	Zm_185_rRNA-4	## ### ##	49476	
NA::NA::NA::Control Plant Seq	Zm_25S_rRNA-5.11	## ### ##	44990	
NA::NA::NA::Control Plant Seq	Zm_25S_rRNA-5	## ### ##	42342	
NA::NA::Control Plant Seq	Zm_18S_rRNA-4.11	## ### ##	39647	Intensity
Potyviridae::Potyvirus::Chilli veinal mottle virus::Solanum nigrum potyvirus	32331144_nt2251.60	## ### ##	35767	
NA::NA::Control Plant Seq	Zm_18S_rRNA-3.11	## ### ##	23461	ordered
NA::NA::Control Plant Seq	Zm_18S_rRNA-3	## ### ##	20266	
NA::NA::Control Plant Seq	Nb_Ubiquitin.11	## ### ##	19564	
Alphaflexiviridae::Potexvirus::Mint virus X::Mint virus X	62327433_nt1387.60_rc	## ### ##	19129	
Geminiviridae::Begomovirus::African cassava mosaic virus::African cassava mosaic virus	9626669_nt0246.60_rc	## ### ##	16365	Multiple
Geminiviridae::Begomovirus::Alternanthera yellow vein virus::Begomovirus	151428448_nt1426.60_rc	## ### ##	14813	Momple
Geminiviridae::Begomovirus::Gossypium punctatum mild leaf curl virus::Viruses	225698175_nt1718.60_rc	## ### ##	10711	la a crana a struct
Unclassified::Unclassified::Persimmon viroid::Persimmon viroid	166788519_nt226.60_rc	## ### ##	10444	begomovirus-
Unclassified::Unclassified::Cherry small circular viroid::Cherry small circular viroid-like RNA 2	86141661_nt171.60	## ### ##	8738	
NA::NA::Control Plant Seq	Zm_18S_rRNA-2.11	## ### ##	8303	
Geminiviridae::Begomovirus::Chilli leaf curl virus::Viruses	198385354_nt1728.60_rc	## ### ##	8105	
Geminiviridae::Begomovirus::African cassava mosaic virus::African cassava mosaic virus	5230633_nt0101.60_rc	## ### ##	8046	probes (blue):
NA::NA::Control Plant Seq	Nb_Cab	## ### ##	7383	
NA::NA::Control Plant Seq	Nb_Cab.11	## ### ##	7283	single probes
Geminiviridae::Begomovirus::Sweet potato leaf curl virus::Begomovirus	195963278_nt1751.60_rc	## ### ##	6481	single probes
Geminiviridae::Begomovirus::Hollyhock leaf crumple virus::Begomovirus	18091744_nt0326.60_rc	## ### ##	6211	for other virus
Geminiviridae::Begomovirus::Sweet potato leaf curl virus::Viruses	195963278_nt1801.60_rc	## ### ##	6082	
NA::NA::Control Plant Seq	Zm_5.8S_rRNA-1	## ### ##	5625	turn and turn all a
Betasatellite::None::Tomato yellow dwarf betasatellite::UT Split Honeysuckle yellow vein mosaic virus satellite DNA beta	156151281_nt0813.60	## ### ##	4786	Types (red)
NA::NA::Control Plant Seq	Arabidopsis_rbcL.11	## ### ##	4608	
Potyviridae::Potyvirus::Bean common mosaic necrosis virus::Bean common mosaic necrosis virus	73426684_nt5535.60_rc	## ### ##	4440	
NA::NA::Control Plant Seq	Zm_5.8S_rRNA-1.11	## ### ##	4282	
Tymoviridae::Tymovirus::Diascia yellow mottle virus::Diascia yellow mottle virus	194473848_nt1877.60_rc	## ### ##	4093	
Alphafiexiviridae::Potexvirus::Lettuce virus X::Lettuce virus X	189458579_nt2451.60_rc	## ### ##	4013	
NA::NA::Control Plant Seq	Arabidopsis_rbcL	## ### ##	3985	
Alphaflexiviridae::Potexvirus::Lettuce virus X::UT Split Scallion virus X	189458579_nt4076.60_rc	## ### ##	3962	
Tymoviridae::Maculavirus::Grapevine fleck virus::Raphanus sativus crvotic virus 1 segment 3	18138525 nt2451.60	## ### ##	3751	
UPVM_P1_012-ACMV.txt _+		-		

Texen       NEXT Tex ID       Score         U12b              • African cassava mosaic virus 10817             • African cassava mosaic virus-Ug.222077             0.0954844             • African cassava mosaic virus-Ug.222077             0.0841919             • African cassava mosaic virus = (0.222061             0.0793771             • African cassava mosaic virus = (0.222061             0.0770119             • Squash leaf curl China virus = (0.2393625             0.07719915             • Squash leaf curl China virus = (0.2393625             0.0673923             • Tomato leaf curl Gujarat virus = 12929             0.0675923             • Tomato leaf curl Gujarat virus = (269306             0.0675923             • Tomato leaf curl New Delhi virus 270143             0.0632402             • Costeroviridæ             • Grapevine leafroll-associated vir64003             0.083573             • Tomato chlorosis virus egment 167754             0.0093293             • Lettuce chlorosis virus segment 167754             0.0093293             • Lettuce chlorosis virus segment 167754             0.0093293             • Lettuce chlorosis virus segment 167754             0.0093939             • Lettuce chlorosis virus segment 1672478             0.0066821             • Cacurbit yellow stunting disordes1330             0.0066267             • Grapevine leafroll-associated vir55951             0.0059755             • Tomato leaf curl China virus sate278069             0.0250101             • Tomato leaf curl China virus set 278069             0.0250101             • Tomato leaf curl China virus set 278069             0.0250101             • Tomato leaf curl China virus set 278069             0.0250101             • Tomato leaf curl Leasstellite             20812             0.0130398             • Tomato leaf curl China virus set 278069             0.0250101             • Tomato leaf curl China virus set 278069             0.01019452	() T4	Predict results		
<ul> <li>U12b</li> <li>Ceminivide</li> <li>African cassava mosaic virus 10817</li> <li>African cassava mosaic virus-Ug.222077</li> <li>African cassava mosaic virus-Ug.222077</li> <li>African cassava mosaic virus-Ug.222077</li> <li>African cassava mosaic virus-Ug.222077</li> <li>African cassava mosaic virus-CC222061</li> <li>African cassava mosaic virus seq10817</li> <li>African cassava mosaic virus seq10817</li> <li>African cassava mosaic virus seq10817</li> <li>Squash leaf curl China virus - [P.335396</li> <li>African cassava mosaic virus 219299</li> <li>African cassava mosaic virus 219299</li> <li>African cassava mosaic virus 212939</li> <li>Costerovirdae</li> <li>Grapevine leafroll-associated vir64003</li> <li>African chlorosis virus segment F67754</li> <li>Afr</li></ul>	T	axon NCBI Tax ID	Score	1
<ul> <li>Geminiviridae</li> <li>African cassava mosaic virus 10817</li> <li>African cassava mosaic virus-Ug.222077</li> <li>0.0841919</li> <li>African cassava mosaic virus-Ig.222061</li> <li>0.07793771</li> <li>African cassava mosaic virus eg10817</li> <li>Squash leaf curl China virus - [C.3393625</li> <li>0.07719915</li> <li>Squash leaf curl China virus - [P.353396</li> <li>Squash leaf curl China virus - [P.35396</li> <li>Squash leaf curl China virus - [P.540030</li> <li>0.0683372</li> <li>Tomato leaf curl Gujarat virus 219299</li> <li>0.0675923</li> <li>Tomato leaf curl Gujarat virus - [269306</li> <li>0.0675923</li> <li>Tomato leaf curl New Delhi virus 270143</li> <li>0.0632402</li> <li>Costeroviridae</li> <li>Grapevine leafroll-associated vir64003</li> <li>0.083573</li> <li>Tomato chlorosis virus segment I67754</li> <li>0.00093213</li> <li>Tomato chlorosis virus segment I67754</li> <li>0.0093213</li> <li>Cucurbit yellow stunting disordes51330</li> <li>0.006621-</li> <li>Ettuce chlorosis virus 3 499955</li> <li>0.0066027-</li> <li>Strawberry crinivirus 3 499955</li> <li>0.0060796</li> <li>Grapevine leafroll-associated vir55951</li> <li>0.0059755</li> <li>Strawberry crinivirus 3 499955</li> <li>0.0060796</li> <li>Grapevine leaf curl China virus sate 278069</li> <li>0.0250101</li> <li>Tomato leaf curl betasatellite 20212</li> <li>0.0130398</li> <li>Tomato yellow dwarf disease associatex (196499</li> <li>Ool191452</li> <li>Ontato yellow dwarf disease associatex (19629)</li> <li>Ool192154</li> <li>Okra leaf curl disease associatex (19629)</li> <li>Ool192072</li> </ul>		U12b		
<ul> <li>African cassava mosaic virus 10817 0.0954844</li> <li>African cassava mosaic virus-Ug222077 0.0841919</li> <li>African cassava mosaic virus-Ug222077 0.0841919</li> <li>African cassava mosaic virus-Ug222071 0.0793771</li> <li>African cassava mosaic virus seq10817 0.0770119</li> <li>Squash leaf curl China virus - [C3393625 0.0719915</li> <li>Squash leaf curl China virus - [P1:335396 0.0683372</li> <li>Squash leaf curl China virus - [P2:34030 0.0683372</li> <li>Tomato leaf curl Gujarat virus - 1269306 0.0675923</li> <li>Tomato leaf curl Gujarat virus - 1269306 0.0675923</li> <li>Tomato leaf curl New Delhi virus 270143 0.0632402</li> <li>Costerovirdæ</li> <li>Grapevine leafroll-associated vir64003 0.083573</li> <li>Tomato chlorosis virus segment 167754 0.0093213</li> <li>Tomato chlorosis virus 642478 0.0093939</li> <li>Lettuce chlorosis virus 642478 0.0066821.</li> <li>Cucurbit yellow stunting disorder51330 0.0066621.</li> <li>Cucurbit yellow stunting disorder51330 0.0066821.</li> <li>Cucurbit yellow stunting disorder51330 0.0059755</li> <li>Krawberry crinivirus 3 499955 0.0060398</li> <li>Tomato leaf curl China virus sate 278069 0.0250101</li> <li>Tomato leaf curl China virus sate 278069 0.0129154</li> <li>Okra leaf curl disease associated vir5951 0.0129154</li> <li>Okra leaf curl disease associated vir5929 0.0119452</li> </ul>		Geminiviridae		
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<ul> <li>Squash leaf curl China virus - [C,339625 0.0719915</li> <li>Squash leaf curl China virus - [P,33036 0.0683372</li> <li>Squash leaf curl China virus - [P,150030 0.0683372</li> <li>Squash leaf curl Gujarat virus 219299 0.0675923</li> <li>Tomato leaf curl Gujarat virus - [269306 0.0675923</li> <li>Tomato leaf curl Gujarat virus - [269306 0.0675923</li> <li>Tomato leaf curl New Delhi virus 270143 0.0632402</li> <li>Costeroviridæ</li> <li>Grapevine leafroll-associated vir64003 0.093573</li> <li>Tomato chlorosis virus 67754 0.0101335</li> <li>Tomato chlorosis virus segment f67754 0.0093913</li> <li>Lettuce chlorosis virus segment f67754 0.0093813</li> <li>Cucurbit yellow stunting disordet51330 0.0066821.</li> <li>Lettuce chlorosis virus 3 499955 0.0066796</li> <li>Grapevine leafroll-associated vir55951 0.0059755</li> <li>Arb famiy</li> <li>Tomato leaf curl China virus sate 278069 0.0250101</li> <li>Tomato leaf curl Stastellite 220812 0.0130398</li> <li>Tomato leaf curl disease associate(169689 0.0119452</li> <li>Paet paretis wildwwarf disease associate(169689 0.0119452</li> </ul>		African cassava mosaic virus seg10817	0.0770119	followed by two other
<ul> <li>Squash leaf curl China virus - [P,335396</li> <li>Squash leaf curl China virus - [P,540030</li> <li>Squash leaf curl China virus - [P,540030</li> <li>Squash leaf curl Gujarat virus - [P,540030</li> <li>Conato leaf curl Gujarat virus - [269306</li> <li>Conato leaf curl Gujarat virus - [269306</li> <li>Costerovirdae</li> <li>Grapevine leafroll-associated vir64003</li> <li>Costerovirdae</li> <li>Grapevine leafroll-associated vir64003</li> <li>Grapevine leafroll-associated vir65951</li> <li>Ou066796</li> <li>Grapevine leafroll-associated vir55951</li> <li>Ou059755</li> <li>Fomato leaf curl bit astellite 220812</li> <li>Ou130398</li> <li>Tomato vellow dwarf disease asseciates (19689)</li> <li>Ou119452</li> <li>Paet paretis unling una virus mainte 21731</li> <li>Ou119452</li> </ul>			0.0719915	
<ul> <li>Squash leaf curl China virus - [Pt.540030</li> <li>Guash leaf curl Gujarat virus 219299</li> <li>Gosterovirdae</li> <li>Closterovirdae</li> <li>Grapevine leafroll-associated vir64003</li> <li>Grapevine leafroll-associated vir64003</li> <li>Tomato chlorosis virus 67754</li> <li>Ou095213</li> <li>Tomato chlorosis virus 642478</li> <li>Ou0939393</li> <li>Lettuce chlorosis virus 642478</li> <li>Ou066821.1</li> <li>Cucurbit yellow stanting disordes51330</li> <li>Ou066267</li> <li>Strawberry crinivirus 3</li> <li>499955</li> <li>Ou060796</li> <li>Grapevine leafroll-associated vir55951</li> <li>Ou059755</li> <li>No family</li> <li>Tomato leaf curl China virus sate278069</li> <li>Ou250101</li> <li>Tomato leaf curl China virus sate278069</li> <li>Ou250101</li> <li>Tomato leaf curl China virus sate278069</li> <li>Ou250101</li> <li>Tomato leaf curl Statellite 220812</li> <li>Ou130398</li> <li>Tomato leaf curl disease associate(169689</li> <li>Ou119452</li> <li>Pant accuratis with warf disease associate(169689</li> <li>Ou119452</li> </ul>			0.0683372	begomoviruses, and then
			0.0683372	much lower probabilities for
<ul> <li>Tomato leaf curl Gujarat virus - [269306</li> <li>Tomato leaf curl New Delhi virus 270143</li> <li>Obsterovirdae</li> <li>Grapevine leafroll-associated vir64003</li> <li>Grapevine leafroll-associated vir64003</li> <li>Tomato chlorosis virus segment 167754</li> <li>Tomato chlorosis virus segment 167754</li> <li>Tomato chlorosis virus segment 167754</li> <li>Cucurbit yellow stunting disorde51330</li> <li>Cucurbit yellow stunting disorde51330</li> <li>Cucurbit yellow stunting disorde51330</li> <li>Cucurbit yellow stunting disorde51330</li> <li>Cucurbit yellow stunting disorde51310</li> <li>Cucurbit y</li></ul>		— Tomato leaf curl Gujarat virus 219299	0.0675923	moen lower probabilities for
•• Tomato leaf curl New Delhi virus 270143       0.0632402         •• Closteroviride       •• Conato leaf curl New Delhi virus 270143       0.0632402         •• Closteroviride       •• Closteroviride       •• Closteroviride         •• Conato chlorosis virus       67754       0.0101335         •• Tomato chlorosis virus segment 167754       0.0095213         •• Tomato chlorosis virus segment 167754       0.00939393         •• Lettuce chlorosis virus 642478       0.0089813         •• Cucurbit yellow stunting disorder 51330       0.0066267         •• Lettuce chlorosis virus 3       499955         •• Crameto leaf curl China virus sate 278069       0.0250101         •• Tomato leaf curl China virus sate 278069       0.0250101         •• Tomato leaf curl disease associate(169689       0.0119452         •• Okra leaf curl disease associate(169689       0.0119452			0.0675923	other virus-specific probes
Costerovindae     Grapevine leafroll-associated vir64003     Grapevine leafroll-associated vir65951     Grapevine leafroll-associated vir55951     Grapevine leafroll-associated vir55951     Grapevine leafroll-associated vir65951     Grapevine leafroll-associated vir65951     Grapevine leafroll-associated vir55951     Grapevine leafroll-associated vir65951     Gotto teaf curl bit virus sate278069     Grapevine leafroll-associated vire sate278059     Gotto teaf curl bit virus v		Tomato leaf curl New Delhi virus 270143	0.0632402	· ·
• Grapevine leafroll-associated vir64003       0.083573         • Tomato chlorosis virus       67754       0.0101335         • Tomato chlorosis virus segment f67754       0.0093213         • Tomato chlorosis virus segment f67754       0.0093393         • Lettuce chlorosis virus segment f67754       0.0093393         • Lettuce chlorosis virus segment f67754       0.0093393         • Lettuce chlorosis virus segment f67754       0.0093913         • Cucurbit yellow stunting disordes51330       0.0079712         • Lettuce chlorosis virus segment f642478       0.0066821.         • Cucurbit yellow stunting disordes51330       0.0066267         • Strawberry crinivirus 3       499955       0.0060796         • Grapevine leafroll-associated vir55951       0.0059755         • No family       •       •         • Tomato leaf curl China virus sate278069       0.0250101         • Tomato leaf curl disease asseciate112       0.0130398         • Tomato yellow dwarf disease ass427315       0.0129154         • Okra leaf curl disease associate(169689       0.0119452         • Reat perstis unling unity un		Closterovinidae		
•• Tomato chlorosis virus       67754       0.0101335         •• Tomato chlorosis virus segment f67754       0.0095213         •• Tomato chlorosis virus segment f67754       0.0093939         •• Lettuce chlorosis virus       642478       0.0089813         •• Cucurbit yellow stunting disorders1330       0.0079712         •• Lettuce chlorosis virus       642478       0.0066267         •• Cucurbit yellow stunting disorders1330       0.0066267         •• Strawberry crinivirus 3       499955       0.0060796         •• Strawberry crinivirus 3       499955       0.0059755         •• No famiy       ••       ••         •• Tomato leaf curl China virus sate278069       0.0250101         •• Tomato leaf curl betasatellite       220812       0.0130398         •• Tomato leaf curl disease associate(169689       0.0119452         •• Okra leaf curl disease associate(169689       0.0119452		Grapevine leafroll-associated vir64003	0.083573	
			0.0101335	
		— Tomato chlorosis virus segment F67754	0.0095213	
•• Lettuce chlorosis virus       642478       0.0089813         •• Cucurbit yellow stunting disorder51330       0.0079712         •• Lettuce chlorosis virus segment 1642478       0.0066821.         •• Cucurbit yellow stunting disorder51330       0.0066267         •• Strawberry crinivirus 3       499955         •• Strawberry crinivirus 3       499955         •• Tomato leaf curl china virus sate278069       0.0250101         •• Tomato leaf curl betasatellite       220812       0.0130398         •• Tomato yellow dwarf disease assciate(169689       0.0119452         •• Okra leaf curl disease associate(169689       0.0119452		— Tomato chlorosis virus segment F67754	0.0093393	
		Lettuce chlorosis virus     642478	0.0089813	
•• Lettuce chlorosis virus segment 1642478       0.0066821.         •• Cucurbit yellow stunting disordet51330       0.0066267.         •• Cucurbit yellow stunting disordet51330       0.0066267.         •• Strawberry crinivirus 3       499955       0.0060796         •• Grapevine leafroll-associated vir55951       0.0059755.         •• No family       •• Tomato leaf curl China virus sate278069       0.0250101         •• Tomato leaf curl betasatellite       220812       0.0130398         •• Tomato yellow dwarf disease ass427315       0.0129154         •• Okra leaf curl disease associate(169689       0.0119452         •• Reat percents unline unin unine 21721       0.0119272		— Cucurbit yellow stunting disorder51330	0.0079712	
			0.0066821	
•• Strawberry crinivirus 3       499955       0.0060796         •• Strawberry crinivirus 3       499955       0.0059755         •• Tomato leaf curl china virus sate278069       0.00250101         •• Tomato leaf curl betasatellite       220812       0.0130398         •• Tomato yellow dwarf disease ass427315       0.0129154         •• Okra leaf curl disease associate(169689       0.0119452         •• Rant parentis unline uning uning 12721       0.0119272		— Cucurbit yellow stunting disorder51330	0.0066267	
Grapevine leafroll-associated vir55951     O.0059755     O.0250101     O.00250101     O.00130398     Orato leaf curl betasatellite 220812     O.0130398     Orato yellow dwarf disease associates 169689     O.0129154     Okra leaf curl disease associates 169689     O.0119452     Okra leaf curl disease associates 10000     Okra leaf curl disease associates 100000     Okra leaf curl disease associates 100000     Okra leaf curl disease associates 100000     Okra leaf curl disease associates 1000000     Okra leaf curl disease associates 1000000     Okra leaf curl disease associates 100000000     Okra leaf curl disease associates 10000000000     Okra leaf curl disease associates 1000000000000000000000000000000000000		- Strawberry crinivirus 3 499955	0.0060796	
-S-No family     -S-No family     -S-No family     -S-No family     -S-No family     -S-Omato leaf curl China virus sate278069     -S-Omato leaf curl betasatellite     220812     0.0130398     -S-Tomato yellow dwarf disease ass427315     0.0129154     -S-Okra leaf curl disease associate(169689     0.0119452     -S-Reat exercise yellow upp vipp ::::::::::::::::::::::::::::::::		Grapevine leafroll-associated vir55951	0.0059755	$\bigcirc$
-®-Tomato leaf curl China virus sate278069         0.0250101           -®-Tomato leaf curl betasatellite         220812         0.0130398           -®-Tomato yellow dwarf disease ass427315         0.0129154           -® Okra leaf curl disease associates169689         0.0119452           -® Act procents unline units units = 21721         0.0119272				
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Best pecrotic vallow vain virus 21721 0.0112972			0.0119452	
Beet field offic yellow velif virus 31/21     O.01129/3		Beet necrotic yellow vein virus 31721	0.0112973	

EXAMPLES OF VIRUSES VALIDATED TO "SPECIES" LEVEL

### Geminiviridae:

ACMV: African cassava mosale virus FACMV: Fast african cassava mosale virus SLCMV: Sri-Lankan cassava mosale virus SECTIVE SECTION AND A SECTIVE SECTION AND A SECTIVE SE

Potyviridae: PVV: Potato virus Y TEV: Tobacco etch virus BYMV: Bean yellow mosaic virus CBSUV: Cassava brown streak Uganda virus TuMV: Turnip Mosaic virus

## Alphaflexiviridae:

PepMV: Pepino mosaic virus AltMV: Alternanthera mosaic virus PIAMV: Plantago asiatic mosaic virus

**Betaflexiviridae** PhIVS: Phlox virus S **PVS: Potato virus S** 

Bromoviridae: CMV: Cucumber mosaic virus

Virgaviridae: TMV: Tobacco mosaie virus

Bunyaviridae: TSWV: Tomato spotted wilt virus

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Others (No family): OuMV: Ourmis melon virus

All results obtained without sample amplification

## **Examples of detection of mixed infections**

Bean yellow mosaie virus + Alternanthera mosaie virus (CKC > direct labeled cDNA) Ligustrum recrotic ringspot virus + Cucumber mosaie virus (CKC > DSN > ABC)



