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CARACTERIZAÇÃO DOS PADRÕES DE RECOMBINAÇÃO DAS PRINCIPAIS SUBPOPULAÇÕES GLOBAIS DE BEGOMOVÍRUS

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Dissertação apresentada à Universidade Federal de Uberlândia, como parte das exigências do Programa de Pós-Graduação em Agronomia, para obtenção do título de "Mestre".

Orientador: Prof. Dr. Alison Talis Martins Lima

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RESUMO

Populações de vírus de plantas apresentam altos níveis de variabilidade genética devido à atuação dos mecanismos evolutivos de mutação, recombinação e pseudorecombinação. Como consequência, populações virais evoluem rapidamente sendo capazes de expandir suas gamas de hospedeiros e suplantar a resistência genética de plantas numa velocidade maior do que populações de outros agentes causadores de doenças. Os begomovírus (gênero *Begomovirus*, família *Geminiviridae*) são altamente propensos à recombinação tanto intra quanto interespecífica. De fato, diversos trabalhos publicados recentemente indicam que a maioria das espécies conhecidas de begomovírus apresentam uma origem recombinante. Por outro lado, devido ao isolamento geográfico das subpopulações desses vírus, é possível que a recombinação afete cada uma de forma distinta. Nesse contexto, o presente estudo teve como objetivo caracterizar os padrões de recombinação em cada uma das principais subpopulações que compõem a metapopulação global dos begomovírus. Para isso, sequências genômicas de isolados de begomovírus coletados em diversas localidades no mundo foram obtidas a partir da base de dados do Genbank e analisadas empregando-se ferramentas computacionais de genética de populações. A metapopulação global foi subdividida em duas até oito grandes subpopulações utilizando-se uma abordagem baseada em estatística multivariada. As sequências correspondentes aos isolados de cada uma das subpopulações foram analisadas para a presença e distribuição dos sítios de recombinação. Os resultados obtidos neste estudo indicam que as principais subpopulações de begomovírus apresentam padrões distintos de recombinação, havendo um isolamento evolutivo determinado pela distribuição geográfica.

Palavras-chave: Bioinformática, Evolução, *Geminiviridae*, Metapopulação, Recombinação.

ABSTRACT

Populations of plant viruses show high levels of genetic variability due to the evolutionary mechanisms of mutation, recombination and pseudorecombination. As a consequence, viral populations evolve rapidly being able to expand their host ranges and overcome the genetic resistance of plants at a faster rate than populations of other disease-causing agents. Begomoviruses (genus *Begomovirus*, family *Geminiviridae*) are highly prone to both intra and interspecific recombination. In fact, several recently published studies indicate that most of the known begomovirus species have a recombinant origin. On the other hand, due to the geographical isolation of begomovirus subpopulations, it is possible that the recombination affects each one in a different extent. In this context, the present study aimed to characterize the recombination patterns in each of the major subpopulations that composes the begomovirus global metapopulation. For this, genomic sequences of begomovirus isolates collected in different locations around the world were obtained from Genbank database and analyzed using computational tools of population genetics. The metapopulation was subdivided into two to eight major subpopulations using a multivariate statistical-based approach. The sequences corresponding to the isolates of each subpopulation were analyzed for the presence and distribution of recombination breakpoints. The results obtained in this study indicate that the major begomovirus subpopulations show distinct recombination dynamics, with an evolutionary isolation determined by their geographic distribution.

Keywords: Bioinformatics, Evolution, *Geminiviridae*, Metapopulation, Recombination.

SUMÁRIO

1. INTRODUÇÃO

A família *Geminiviridae* compreende vírus com genomas de DNA de fita simples circulares encapsidados em partículas icosaédricas geminadas (Zhang *et al*., 2001). Ela é dividida em nove gêneros (*Becurtovirus*, *Begomovirus*, *Capulavirus*, *Curtovirus*, *Eragrovirus*, *Grablovirus*, *Mastrevirus*, *Topocuvirus* e *Turncurtovirus*), sendo o mais importante e numeroso o gênero *Begomovirus* (Varsani *et al.*, 2014/2017; Brown *et al.*, 2015). Os begomovírus são transmitidos por um complexo de espécies crípticas de moscas-brancas (denominado *Bemisia tabaci*) e infectam, exclusivamente, plantas dicotiledôneas. São vírus de grande importância para a agricultura que causam perdas severas em várias culturas como, por exemplo, tomateiro, mandioca, algodão, dentre outras (Esterhuizen *et al.*, 2013; Brown *et al.*, 2015). Esses patógenos também causam doenças em espécies de plantas silvestres e invasoras (Moriones *et al.*, 2011; Tavares *et al.*, 2012; Barreto *et al.*, 2013; Mar *et al.*, 2017).

Trabalhos publicados indicam que a variabilidade genética de populações de begomovírus é alta, especialmente daquelas associadas às plantas daninhas e silvestres (Silva *et al.*, 2012; Lima *et al.*, 2013; Rocha *et al.*, 2013). Como consequência, populações de begomovírus apresentam um grande potencial adaptativo, sendo capazes de ampliar suas gamas de hospedeiros e suplantar a resistência genética de variedades de plantas cultivadas, o que dificulta significativamente seu controle (Seal *et al.*, 2006a).

Os mecanismos evolutivos responsáveis pelos níveis elevados de variabilidade dos begomovírus são mutação, recombinação e pseudorecombinação (Roossinck, 1997; García-Arenal *et al.*, 2003; Silva *et al.*, 2014; Lima *et al.*, 2017). Um número considerável de mutações ocorre naturalmente durante o processo de replicação viral e são responsáveis pela maior fração da variabilidade genética observada nessas populações (Lima *et al.*, 2017). A recombinação refere-se à troca de fragmentos de ácidos nucleicos entre vírus distintos (García- Arenal *et al.*, 2003). Esse mecanismo é responsável por novas combinações genotípicas a partir da variabilidade gerada primariamente pelo mecanismo de mutação, o que amplia consideravelmente o espaço de sequência (conjunto composto por todas as variantes virais possíveis) explorado por esses vírus.

Begomovírus recombinantes são responsáveis por epidemias em culturas de grande importância econômica em vários países, inclusive no Brasil (Monci *et al.*, 2002; Ndunguru *et al.*, 2005; Inoue-Nagata *et al.*, 2006; Mansoor *et al.*, 2008; De Bruyn *et al.*, 2016). Vários trabalhos publicados nas últimas décadas reforçam que populações de begomovírus encontradas no Brasil são compostas pelos mais diversos tipos de recombinantes (Lima *et al.*,

2013; Rocha *et al.*, 2013; Sobrinho *et al.*, 2014).

Por outro lado, a ocorrência de infecções mistas envolvendo dois ou mais begomovírus bipartidos em um mesmo núcleo de uma célula vegetal (Sanz *et al.*, 2000; Morilla *et al.*, 2004) permite a troca de componentes genômicos completos. Esse processo é conhecido como pseudorecombinação. Embora dados experimentais confirmem a viabilidade de formação de pseudorecombinantes entre estirpes ou mesmo espécies distintas de begomovírus, sua importância em nível de campo é pouco conhecida (Méndez-Lozano *et al.*, 2003; Varma and Malathi, 2003; Seal *et al.*, 2006d).

Com o surgimento de novas técnicas moleculares, tais como a amplificação de moléculas de DNA circular utilizando-se a DNA polimerase do bacteriófago phi29 (Haible *et al.*, 2006), o número de genomas virais disponíveis em bases de dados públicas (tais como, o GenBank) tem crescido exponencialmente ao longo dos últimos anos. O acesso facilitado a esses conjuntos de dados permite que se empregue um repertório variado de ferramentas computacionais para extração de informações epidemiológicas relevantes. Diversas ferramentas de bioinformática estão disponíveis para estudos populacionais, ampliando de forma significativa o conhecimento acerca dos parâmetros genético-evolutivos virais (Posada, 2002; Martin *et al.*, 2015).

Vários estudos sobre processos evolutivos em escala populacional têm sido realizados recentemente (Rocha *et al.*, 2013; Mahatma *et al.*, 2016; Kumar *et al.*, 2017a; Macedo *et al.*, 2017; Mar *et al.*, 2017). A estrutura genética (padrão de distribuição da variabilidade genética dentro e entre subpopulações) da metapopulação (conjunto de várias subpopulações) global de begomovírus foi analisada por Prasanna *et al.* (2010). Neste estudo, um total de 690 sequências completas de DNA-A foram analisadas e indicaram que a metapopulação dos begomovírus pode ser subdividida em, pelo menos, sete grandes subpopulações geneticamente diferenciadas. Entretanto, o número de sequências de DNA-A disponíveis aumentou cerca de seis vezes desde a realização deste estudo e isolados de subpopulações virais adicionais podem ter sido amostradas ao longo dos últimos anos.

Dado o isolamento geográfico e, talvez, evolutivo, das principais subpopulações globais de begomovírus, é possível que os mecanismos de mutação, recombinação e pseudorecombinação atuem de formas distintas em cada uma delas. Entretanto, nenhum estudo comparativo dos padrões evolutivos nessas subpopulações foi conduzido até a presente data. Nesse contexto, o objetivo geral deste estudo foi caracterizar os padrões de recombinação em cada uma das principais subpopulações de begomovírus. Os objetivos específicos incluíram: (*i*) determinar a estrutura genética da metapopulação global dos begomovírus; (*ii*) detectar a presença e determinar a distribuição de sítios (breakpoints) de recombinação ao longo de

genomas de begomovírus pertencentes a cada uma das grandes subpopulações virais e; (*iii*) identificar regiões genômicas mais propensas à ocorrência de recombinação também conhecidas como “hotspots”.

2. REVISÃO DE LITERATURA

2.1. *Família Geminiviridae*

A família *Geminiviridae* é composta por vírus não envelopados, com genomas compostos por DNA de fita simples (ssDNA) circulares, com aproximadamente 2.500 a 5.200 nucleotídeos de comprimento. Esses vírus são transmitidos por vários tipos de insetos-vetores como moscas-brancas, cigarrinhas e afídeos. A família é dividida em nove gêneros (*Becurtovirus*, *Begomovirus*, *Capulavirus*, *Curtovirus*, *Eragrovirus*, *Grablovirus*, *Mastrevirus*, *Topocuvirus* e *Turncurtovirus*) com base no relacionamento filogenético e organização genômica (Hull, 2009; Zerbini *et al.*, 2017).

Os geminivírus causam doenças relevantes para a produção agrícola nas regiões tropicais e subtropicais do mundo, afetando severamente culturas como o algodoeiro, soja, batata, cucurbitáceas, feijoeiro, mandioca, milho, pimentão e tomateiro (Kashina *et al.*, 2003; Varma and Malathi, 2003; Legg *et al.*, 2004; Rocha *et al.*, 2013; Sattar *et al.*, 2013). A ampla distribuição dos insetos vetores, a expansão do cultivo em monocultura e a ocorrência de um maior trânsito global de plantas são considerados os principais fatores que facilitaram a emergência dos geminivírus (Moriones *et al.*, 2011; Gilbertson *et al.*, 2015).

2.2. *Gênero Begomovirus*

O gênero *Begomovirus* compreende um total de 388 espécies oficialmente reconhecidas pelo International Committee on Taxonomy of Viruses (ICTV), sendo considerado o gênero mais numeroso de vírus que infectam plantas (Zerbini *et al.*, 2017). Os begomovírus são transmitidos por um complexo de espécies crípticas de moscas-brancas conhecidas como *Bemisia tabaci* (Homoptera: Aleyrodidae), a espécies de plantas dicotiledôneas (Esterhuizen *et al.*, 2013; Masood *et al.*, 2017). Algumas espécies de begomovírus se destacam como sendo responsáveis por severas epidemias como o *Tomato yellow leaf curl virus* (TYLCV), *Cotton leaf curl virus* (CLCuV), *East African cassava mosaic virus* (EACMV), dentre outras. Os begomovírus são divididos em dois grandes grupos filogeneticamente distintos: aqueles provenientes das Américas (conhecidos como begomovírus do Novo Mundo) e aqueles provenientes da Europa, Ásia, África e Oceania (conhecidos como begomovírus do Velho Mundo) (Rybicki, 1994). A maioria dos begomovírus do 'Novo Mundo' possui dois componentes genômicos (Figura 1) conhecidos como DNA-A e DNA-B (Brown *et al.*, 2015;

Zerbini *et al.*, 2017), embora isolados monopartidos nativos das Américas tenham sido descritos (Melgarejo *et al.*, 2013; Sánchez-Campos *et al.*, 2013).

O DNA-A contém genes envolvidos na replicação viral e síntese da capa proteica, enquanto o DNA-B possui genes associados ao movimento e expressão de sintomas (Zerbini *et al.*, 2017). No DNA-A dos begomovírus do Novo Mundo há cinco genes: *rep*, que codifica a única proteína essencial à replicação, iniciadora do mecanismo de replicação por círculo rolante (Fontes *et al.*, 1992; Orozco *et al.*, 1997); *trap*, que codifica um fator transcricional dos genes *cp* e *nsp*, e que também atua como supressora do silenciamento gênico (Sunter *et al.*, 1990; Voinnet *et al.*, 1999; Wang *et al.*, 2005); *ren*, que codifica um fator acessório da replicação viral (Pedersen and Hanley-Bowdoin, 1994); *ac4*, que codifica uma proteína também envolvida na supressão de silenciamento gênico (Vanitharani *et al.*, 2004); e *cp*, que codifica a proteína capsidial, essencial para a transmissão do vírus pelo inseto vetor (Briddon *et al.*, 1990; Höfer *et al.*, 1997). O DNA- B contém dois genes: *nsp*, que codifica a proteína responsável pelo transporte do DNA através do envelope nuclear (Noueiry *et al.*, 1994; Sanderfoot and Lazarowitz, 1996); e *mp*, que codifica a proteína envolvida no movimento célula-a-célula do vírus por meio do aumento do limite de exclusão dos plasmodesmas (Noueiry *et al.*, 1994).

Os begomovírus do 'Velho Mundo' possuem, em sua maioria, um componente genômico homólogo ao DNA-A dos begomovírus bipartidos, e estão frequentemente associados às moléculas de DNA fita simples circulares, conhecidos como alpha- e betasatélites (Briddon *et al.*, 2001).

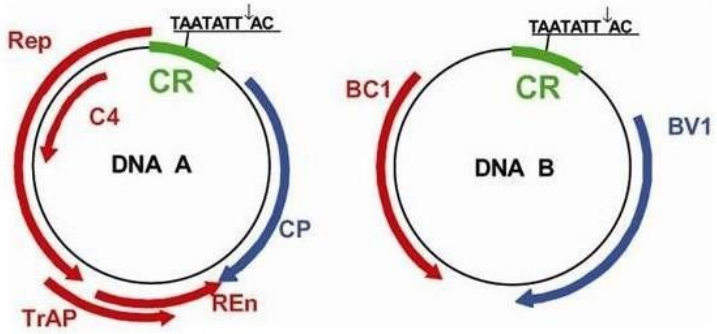


Figura 1. Representação esquemática do genoma do *Bean golden yellow mosaic virus* (BGYMV), espécie-tipo do gênero *Begomovirus*. Os círculos representam o genoma viral, com dois componentes (DNA-A e DNA-B) de aproximadamente 2.600 nucleotídeos cada. Uma sequência de aproximadamente 200 nucleotídeos, denominada região comum (CR), contém a origem de replicação viral, com uma estrutura em forma de grampo e uma sequência invariável de nove nucleotídeos (nonanucleotídeo: TAATATT↓AC), conservada em todos os membros da família *Geminiviridae*. A seta (↓) indica o sítio de início da replicação do DNA viral por círculo rolante. As setas azuis e vermelhas indicam os genes virais e a direção em que ocorre a transcrição (viral e complementar, respectivamente). Reproduzido de Gutierrez *et al.* (2004).

2.3. Ciclo de infecção viral

A emergência e importância econômica das doenças causadas pelos begomovírus está intimamente relacionada com a distribuição e o hábito alimentar altamente polífago de seu vetor (Gilbertson *et al.*, 2015). A introdução dos begomovírus em uma lavoura ocorre pela ação da mosca-branca a partir de fontes de inóculo existentes em áreas vizinhas (Faria *et al.*, 2000). A transmissão viral ocorre de modo persistente circulativo (Gilbertson *et al.*, 2015). As partículas virais são adquiridas durante o processo de alimentação em plantas infectadas, entram no esôfago e subsequentemente são transportadas através da parede do intestino para a hemolinfa, onde circulam até adentrarem na glândula salivar, a partir da qual são transmitidas para novas plantas durante a alimentação do inseto (Ghanim *et al.*, 2007).

Uma vez inoculadas em plantas hospedeiras sadias, o DNA viral se dissocia de forma espontânea do capsídeo (Palmer and Rybicki, 1998). No interior da célula o ssDNA viral é transportado para o núcleo onde é transformado em um intermediário de fita dupla (dsDNA), chamado forma replicativa (RF). A RF serve como molde para síntese dos novos componentes genômicos e para a transcrição dos genes virais. O genoma é replicado via mecanismo de círculo rolante utilizando a RF como molde (Stanley, 1995).

Após a replicação viral ocorrer, o vírus se move na planta hospedeira por meio de dois processos distintos: o primeiro envolve o movimento célula-a-célula e o segundo envolve o movimento a longa distância, no qual o vírus atinge o sistema vascular e é transportado para toda a planta. Para esse fim, são codificadas duas proteínas relacionadas ao movimento viral, NSP (replicação viral e síntese da capa proteica) e MP (movimento e expressão dos sintomas). Essas duas proteínas atuam de forma cooperativa para permitir ao vírus infectar sistematicamente o hospedeiro (Sanderfoot and Lazarowitz, 1995; Sanderfoot *et al.*, 1996).

2.4. Microevolução dos begomovírus

Vários estudos indicam que populações de begomovírus apresentam altos níveis de variabilidade genética (Ariyo *et al.*, 2005; Ge *et al.*, 2007; Silva *et al.*, 2012; Mar *et al.*, 2017). Os principais mecanismos responsáveis pela evolução dos begomovírus são a mutação e recombinação (Sanz *et al.*, 1999; García-Arenal *et al.*, 2003). Devido à estrutura segmentada dos genomas de muitos begomovírus (dividido em duas moléculas: DNA-A e DNA-B), estes também podem diversificar-se por um mecanismo adicional chamado pseudorecombinação (rearranjo), no qual componentes genômicos inteiros são trocados entre vírus da mesma espécie

ou mesmo entre vírus de espécies distintas (Gilbertson *et al.*, 1993; Sung and Coutts, 1995; García-Arenal *et al.*, 2003). Embora os begomovírus sejam capazes de formar pseudorecombinantes em condições de laboratório (Silva *et al.*, 2014), sua ocorrência em condições de campo não tem sido descrita com frequência.

A mutação é um tipo de alteração no qual nucleotídeos são incorretamente incorporados às fitas-filhas durante o processo de replicação dos ácidos nucleicos. Há evidências de que a rápida evolução dos begomovírus é dirigida por processos mutacionais que agem especificamente sobre ssDNA (Duffy and Holmes, 2008). Devido ao fato das RNAs polimerases virais não apresentarem atividade de correção de erro (proofreading), acreditava-se que populações de vírus de RNA apresentavam níveis de variabilidade genética maiores do que aqueles de populações de vírus de DNA. Entretanto, contrário à essa expectativa, vírus com genomas de DNA também estão sujeitos a altos níveis de mutações durante o processo de replicação (Drake, 1991).

A recombinação é o processo no qual fragmentos de ácidos nucleicos (DNA ou RNA) são trocados entre as fitas de nucleotídeos de diferentes variantes genéticas durante o processo de replicação viral (Padidam *et al.*, 1999; García-Arenal *et al.*, 2003). Há inúmeros relatos da ocorrência de begomovírus recombinantes na natureza e este mecanismo parece contribuir de forma considerável para a variabilidade genética desses vírus, aumentando seu potencial evolutivo e sua capacidade de adaptação local (Padidam *et al.*, 1999). A ocorrência de infecções mistas no campo, ou seja, mais de um vírus infectando uma mesma planta, viabiliza trocas de fragmentos de materiais genéticos entre vírus (Sanz *et al.*, 2000).

A elevada frequência de recombinação nesse grupo de vírus pode ser em parte explicada pela existência de uma possível estratégia de replicação, dependente de recombinação (RDR) (Jeske *et al.*, 2001; Preiss and Jeske, 2003) em adição à replicação por círculo rolante (RCR).

Vírus recombinantes são responsáveis por sérias epidemias ao redor do mundo. O mosaico da mandioca na África causada pelo begomovírus EACMV (Zhou *et al.*, 1997), o enrolamento foliar amarelo do tomateiro na Espanha causado pelo TYLCV (Monci *et al.,* 2002) e o enrolamento foliar do algodão no Paquistão causado pelo *Cotton leaf curl virus* (CLCuV) (Idris and Brown, 2002) são exemplos de epidemias causadas por begomovírus recombinantes. Os mecanismos precisos que controlam a recombinação em begomovírus permanecem desconhecidos (Padidam *et al.*, 1999; Desbiez and Lecoq, 2008). No entanto, é conhecido que sítios recombinantes não são uniformemente distribuídos ao longo do genoma com a existência de sítios frequentes (hotspots) e não-frequentes (coldspots) (Lefeuvre *et al.*, 2007/2009; Martin *et al.*, 2011).

Com o advento da técnica de amplificação de moléculas de DNA circulares, por meio do uso da DNA polimerase (Haible *et al.*, 2006) do phago phi29, e devido à grande disponibilidade de softwares de bioinformática capazes de detectar regiões recombinantes em genomas virais (Posada, 2002; Martin *et al.*, 2015), o mecanismo evolutivo de recombinação tem sido estudado ao longo dos últimos anos (De Bruyn *et al.*, 2016; Ferro *et al.*, 2017; Jeevalatha *et al.*, 2017; Lima *et al.*, 2017; Mar *et al.*, 2017; Vinoth Kumar *et al.*, 2017). O conhecimento acerca da frequência na qual a recombinação ocorre é essencial, pois populações virais sujeitas à ocorrência frequente de eventos de recombinação possuem maior capacidade adaptativa do que aquelas populações pouco propensas à recombinação (Monci *et al.*, 2002; Prasanna and Rai, 2007; Vuillaume *et al.*, 2011).

3. MATERIAL E MÉTODOS

3.1. Obtenção das sequências genômicas virais

Um total de 3.807 sequências completas referentes ao DNA-A de isolados de begomovírus disponíveis no Genbank foram obtidas em março de 2018 por meio do "Taxonomy Browser" (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi) (Tabela 1, ANEXOS). Todas as sequências foram organizadas de forma a iniciarem-se no sítio de clivagem do nonanucleotídeo conservado (TAATATT↓AC), localizado na origem de replicação dos geminivírus. O conjunto de dados empregado neste estudo representa, portanto, a metapopulação global de begomovírus, compreendida por isolados pertencentes a 388 espécies virais oficialmente aceitas pelo International Committee on Taxonomy of Viruses (ICTV) (Brown *et al.*, 2015).

3.2. Alinhamentos de sequências e análise discriminante de componentes principais

Alinhamentos múltiplos de sequências representando tanto a metapopulação global quanto as subpopulações individuais de begomovírus foram construídos utilizando-se o programa Muscle (Edgar, 2004) e manualmente corrigidos no Mega X (Kumar *et al.*, 2018). Para inferir as principais subpopulações que compõem a metapopulação global dos begomovírus, o alinhamento múltiplo de sequências de isolados da metapopulação foi analisado por meio de uma abordagem de estatística multivariada utilizando-se a análise discriminante de componentes principais (Discriminant Analysis of Principal Components, DAPC). Nessa abordagem, a variância da amostra foi dividida no intuiro de maximizar a discriminação genética entre os grupos de isolados virais. A análise foi conduzida utilizando-se o pacote Adegenet (Jombart 2008) implementado no programa R (R Development Core Team and R Core Team 2008). As subpopulações foram inicialmente inferidas por K-means em valores crescentes de K (K = 2 até 8; ou seja, de duas até oito grandes subpopulações), retendo todos os componentes principais. Os diferentes cenários de agrupamento foram comparados usando o Bayesian Information Criterion (BIC).

3.3. Caracterização dos padrões de recombinação

Alinhamentos múltiplos de sequências das subpopulações individuais foram analisados para a presença de segmentos recombinantes utilizando-se os métodos RDP, Geneconv, Bootscan, Maximum Chi Square, Chimaera, Sister Scan e 3Seq, implementados no "Recombination Detection Program" versão 4 (Martin *et al.*, 2015). Somente eventos de recombinação detectados por, pelo menos, quatro dos métodos de análise disponíveis no programa foram considerados válidos nas análises subsequentes.

A distribuição de sítios (breakpoints) de recombinação em janelas móveis de 200 nucleotídeos foi determinada utilizando-se a opção "breakpoint distribution plot", também disponível no programa RDP4 (Recombination Detection Program 4). Os mapas gerados representam o número de sítios de recombinação contidos em cada uma das janelas móveis que percorrem toda a extensão dos genomas virais. Para avaliar a significância estatística dos "hotspots" de recombinação detectados durante a análise, foi empregado o teste de permutação com 3.000 replicações.

4. RESULTADOS

4.1. Inferência da estrutura genética da metapopulação global dos begomovírus

A metapopulação global dos begomovírus, representada por todo o conjunto de sequências de isolados virais coletados em diversas regiões do mundo, foi submetida a simulações de subdivisão de populações via análise discriminante de componentes principais, assumindo-se números crescentes de subpopulações. Quando a metapopulação global foi subdivida em duas grandes subpopulações geneticamente diferenciadas, observou-se que a primeira foi composta por todos os begomovírus nativos do Velho Mundo, totalizando 2.505 isolados virais; enquanto a segunda subpopulação foi composta por 1.302 isolados de begomovírus nativos do Novo Mundo.

Quando foram simuladas três subpopulações (Figura 2), a subpopulação 3.1 foi composta por 999 isolados virais, em sua maioria pertencentes às espécies *East african cassava mosaic vírus* (EACMV) e *Sweet potato leaf curl vírus* (SPLCV), coletados principalmente em países do continente africano. A subpopulação 3.2 foi composta em sua maioria por isolados nativos do Novo Mundo pertencentes às espécies *Macroptilium yellow mosaic vírus* (MacYMV), *Euphorbia yellow mosaic vírus* (EuYMV), *Tomato leaf deformation virus* (ToLDeV) e *Bean golden mosaic vírus* (BGMV), totalizando 1.302 isolados. A subpopulação 3.3 foi compreendida por 1.506 isolados nativos do Velho Mundo pertencentes predominantemente às espécies *Malvastrum yellow mosaic vírus* (MaYMV), *Tomato leaf curl vírus* (ToLCV), *Mungbean yellow mosaic virus* (MYMV) e *Cotton leaf curl vírus* (CLCuV).

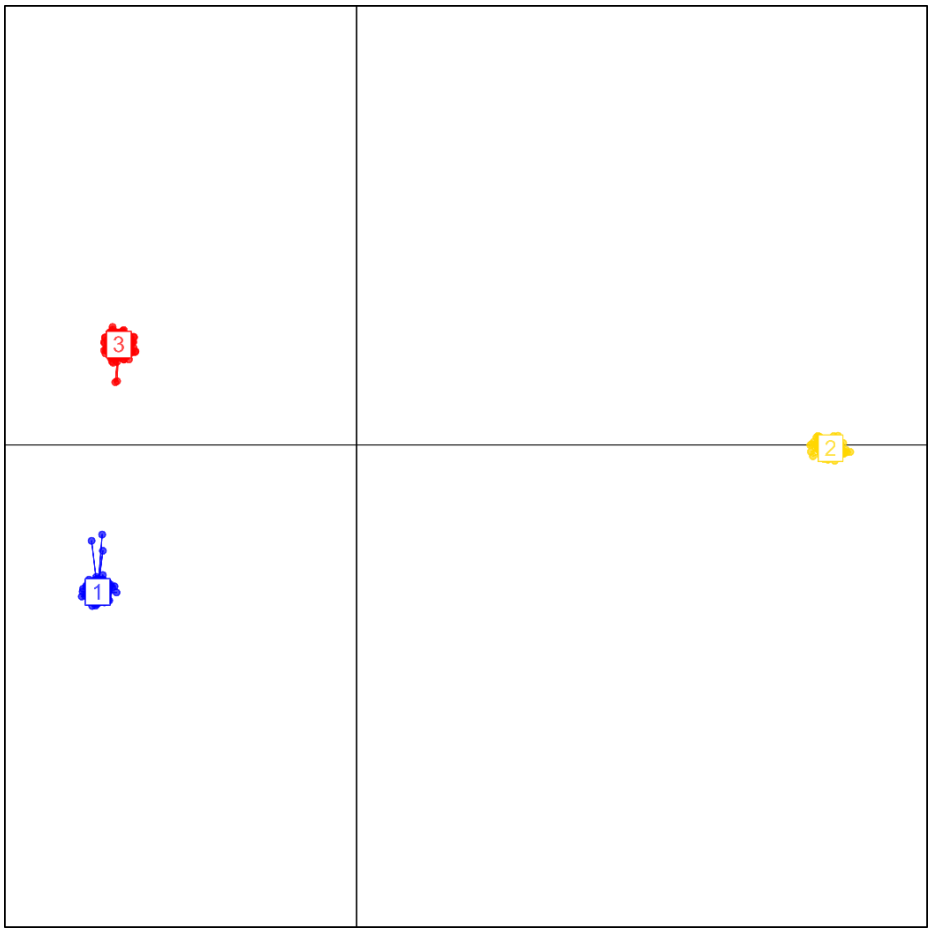


Figura 2. Gráfico de dispersão da análise estatística multivariada de subdivisão da metapopulação global de begomovírus baseada em sequências completas de DNA-A. Na simulação acima, foram assumidas três grandes subpopulações geneticamente diferenciadas. Cada ponto colorido representa um isolado de begomovírus e cada agrupamento de pontos de uma dada cor representa uma subpopulação. A similaridade genética entre as subpopulações virais assumidas está representada em escala na figura.

Quando foram assumidas quatro subpopulações (Figura 3), a subpopulação 4.1 foi compreendida por 443 isolados virais, predominantemente pertencentes às espécies *Euphorbia mosaic vírus* (EuMV), *Pepper golden mosaic virus* (PepGMV) e *Rhynchosia golden mosaic vírus* (RhGMV), todos nativos da Mesoamérica. Por outro lado, a subpopulação 4.2 foi composta em sua maioria por isolados das espécies *Macroptilium golden mosaic vírus* (MacGMV), *Sida micrantha mosaic vírus* (SiMMV), *Bean golden mosaic virus* (BGMV) e *Tomato mottle leaf curl vírus* (ToMoLCV), totalizando 859 isolados coletados nas Américas. A subpopulação 4.3 foi composta por 760 isolados nativos do continente africano pertencentes, principalmente, às espécies *African cassava mosaic vírus* (ACMV), *East African cassava mosaic vírus* (EACMV) e *South African cassava mosaic vírus* (SACMV). A subpopulação 4.4 foi composta por 1.745 isolados asiáticos de begomovírus pertencentes às espécies *Okra yellow crinkle vírus* (OYCrV), *Cotton leaf curl vírus* (CLCuV), *Bhendi yellow vein mosaic virus*

(BYVMV) e *Sweet potato leaf curl vírus* (SPLCV).

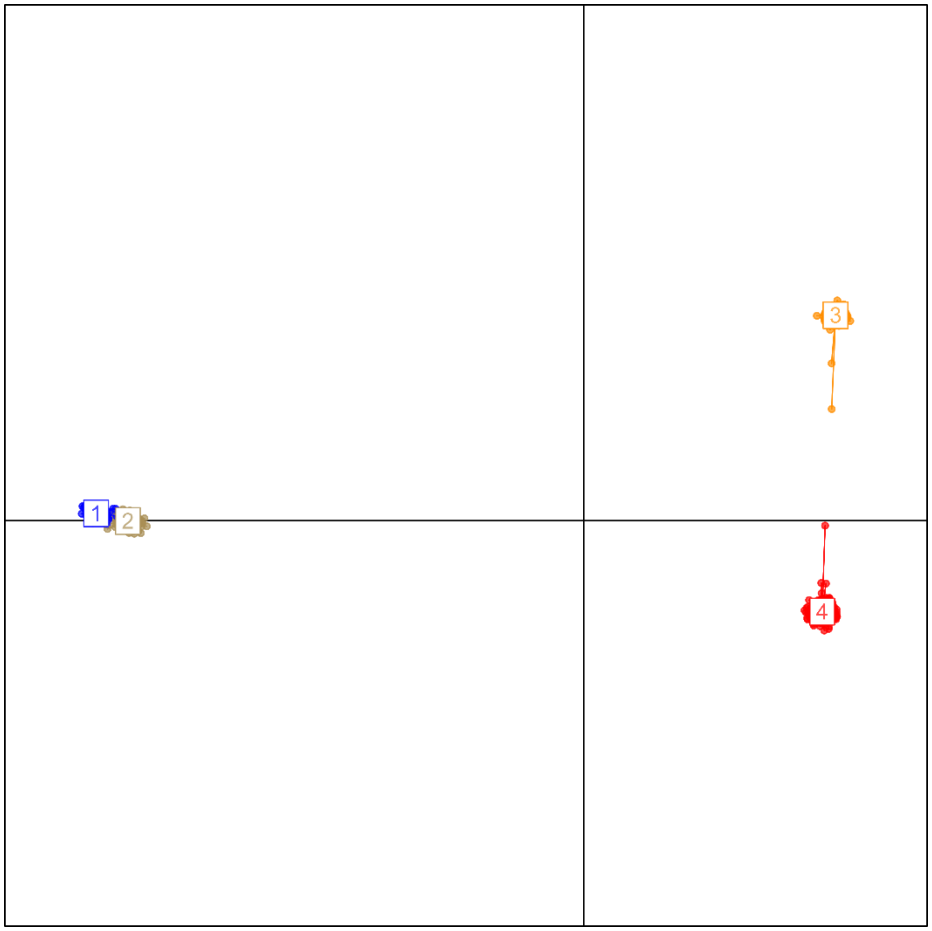


Figura 3. Gráfico de dispersão da análise estatística multivariada de subdivisão da metapopulação global de begomovírus baseada em sequências completas de DNA-A. Na simulação acima, foram assumidas quatro grandes subpopulações geneticamente diferenciadas. Cada ponto colorido representa um isolado de begomovírus e cada agrupamento de pontos de uma dada cor representa uma subpopulação. A similaridade genética entre as subpopulações virais assumidas está representada em escala na figura.

Na simulação em que foram assumidas cinco subpopulações (Figura 4), a subpopulação 5.1 foi compreendida por 213 isolados da espécie *Sweet potato leaf curl vírus* (SPLCV), coletados predominantemente na China. A subpopulação 5.2 foi composta por 760 isolados africanos das espécies *African cassava mosaic virus* (ACMV) e *East African cassava mosaic vírus* (EACMV). Já a subpopulação 5.3 foi compreendida por 352 isolados da espécie *Euphorbia yellow mosaic vírus* (EuYMV), todos coletados no Brasil. A subpopulação 5.4 foi composta por 974 isolados virais, coletados na América Central (pertencentes às espécies *Corchorus golden mosaic virus* (CoGMV), *Cleome leaf crumple virus* (CleLCrV) e *Tomato severe leaf curl virus* (ToSLCV)) e Brasil (*Bean golden mosaic virus* (BGMV) e *Macroptilium yellow spot virus* (MaYSV)). Por último, a subpopulação 5.5 incluiu 1.508 isolados nativos do Velho Mundo

(mais especificamente, da Ásia) pertecentes às espécies *Pepper yellow vein virus* (PepYVV), *Tomato yellow leaf curl virus* (TYLCV), *Cotton leaf curl virus* (CLCuV) e *Bhendi yellow vein mosaic virus* (BYVM).

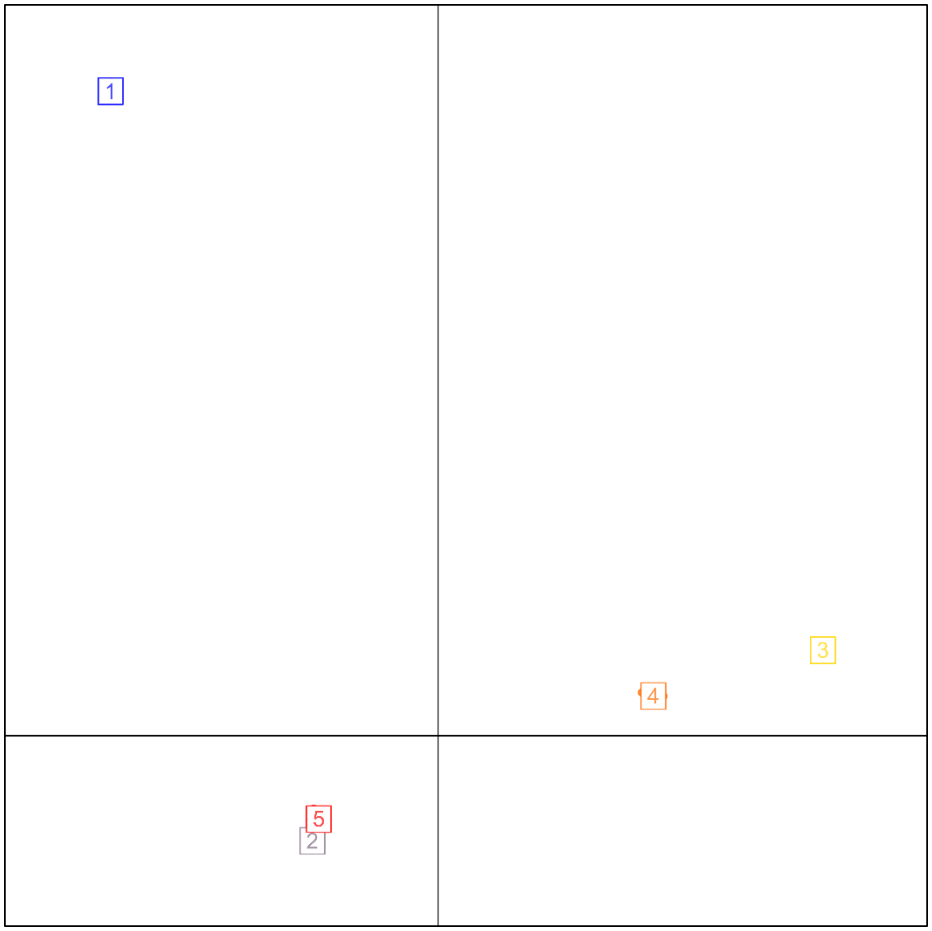


Figura 4. Gráfico de dispersão da análise estatística multivariada de subdivisão da metapopulação global de begomovírus baseada em sequências completas de DNA-A. Na simulação acima, foram assumidas cinco grandes subpopulações geneticamente diferenciadas. Cada ponto colorido representa um isolado de begomovírus e cada agrupamento de pontos de uma dada cor representa uma subpopulação. A similaridade genética entre as subpopulações virais assumidas está representada em escala na figura.

Na análise discriminante de componentes principais, em que foram assumidas seis subpopulações virais (Figura 5)**,** a subpopulação 6.1 foi composta por 74 isolados, sendo a maioria pertencente às espécies *Squash leaf curl virus* (SLCuV) e *Tomato leaf curl vírus* (ToLCV), coletados em países africanos. A subpopulação 6.2 foi composta por 527 isolados das espécies *East African cassava mosaic virus* (EACMV) e *South African cassava mosaic virus* (SACMV), todos coletados na África. A subpopulação 6.3 foi composta por 1.302 isolados brasileiros, pertencentes às espécies *Cleome leaf crumple virus* (CleLCrV), *Tomato severe rugose virus* (ToSRV), *Jatropha mosaic virus* (JMV), *Bean golden mosaic virus* (BGMV) e

Euphorbia yellow mosaic virus (EuYMV). Por outro lado, a subpopulação 6.4 foi compreendida por 1.463 isolados de begomovírus nativos do Velho Mundo, pertencentes predominantemente às espécies *Cotton leaf curl virus* (CLCuV), *Sida leaf curl virus* (SiLCuV), *Bhendi yellow vein virus* (BYVV) e *Tobacco curly shoot virus* (TbCSV). Por sua vez, a subpopulação 6.5 foi composta por 228 isolados da espécie *African cassava mosaic virus*, todos coletados no continente africano. A subpopulação 6.6 foi composta por 213 isolados da espécie *Sweet potato leaf curl virus* (SPLCV), coletados em países do Velho Mundo.

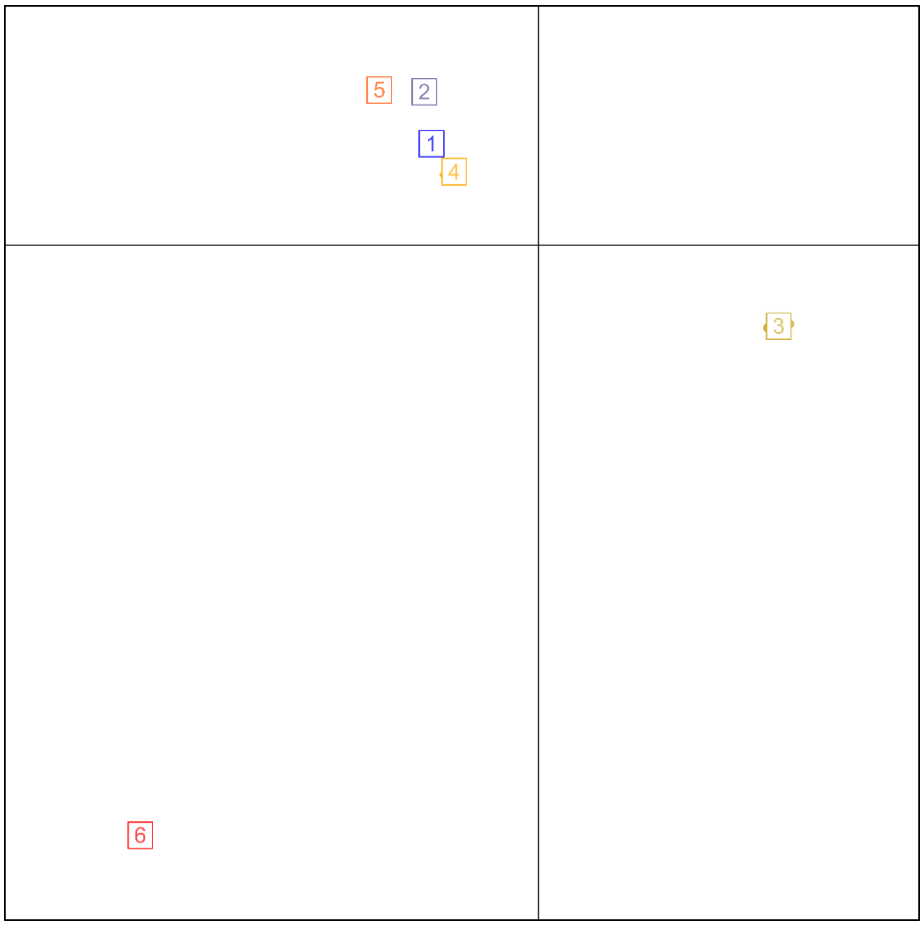


Figura 5. Gráfico de dispersão da análise estatística multivariada de subdivisão da metapopulação global de begomovírus baseada em sequências completas de DNA-A. Na simulação acima, foram assumidas seis grandes subpopulações geneticamente diferenciadas. Cada ponto colorido representa um isolado de begomovírus e cada agrupamento de pontos de uma dada cor representa uma subpopulação. A similaridade genética entre as subpopulações virais assumidas está representada em escala na figura.

Simulando-se sete subpopulações virais (Figura 6), a subpopulação 7.1 foi composta por 866 isolados brasileiros, predominantemente das espécies *Sida golden mosaic virus* (SiGMV), *Macroptilium yellow spot virus* (MacYSV), *Tomato severe rugose virus* (ToSRV) e *Bean golden mosaic virus* (BGMV). A subpopulação 7.2 foi compreendida por 429 isolados de vírus

nativos do Velho Mundo, pertencentes predominantemente às espécies *Tomato yellow leaf curl virus* (TYLCV), *Papaya leaf curl virus* (PLCV), *Tomato leaf curl virus* (TLCV), *Pepper yellow leaf curl virus* (PepYLCV) e *Ageratum yellow vein virus* (AYVV). A subpopulação 7.3 foi composta por 282 isolados nativos da África, pertencentes à espécie *East African cassava mosaic virus* (EACMV). A subpopulação 7.4 foi composta por 436 isolados das Américas do Sul e Central, representando as espécies *Euphorbia yellow mosaic virus* e *Pepper golden mosaic virus*. A subpopulação 7.5 foi composta por 1.104 isolados nativos do Velho Mundo, predominantemente das espécies *Corchorus golden mosaic virus* (CoGMV), *Tomato leaf curl virus* (ToLCV), *Bhendi yellow vein mosaic virus* (BYVMV), *Tobacco curly shoot virus* (TbCSV) e *Okra enation leaf curl virus* (OELCuV). A subpopulação 7.6 foi compreendida por 213 isolados nativos do Velho Mundo, pertencentes à espécie *Sweet potato leaf curl virus* (SPLCV). Por fim, a subpopulação 7.7 foi composta por 477 isolados virais da África, representando as espécies *South African cassava mosaic virus* (SACMV), *East African cassava mosaic virus* (EACMV) e *African cassava mosaic virus* (ACMV).

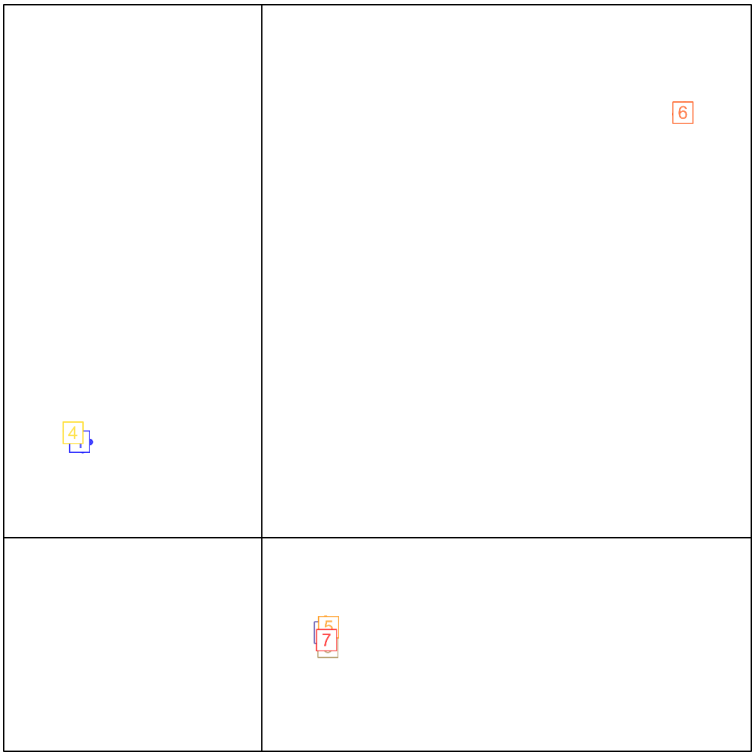


Figura 6. Gráfico de dispersão da análise estatística multivariada de subdivisão da metapopulação global de begomovírus baseada em sequências completas de DNA-A. Na simulação acima, foram assumidas sete grandes subpopulações geneticamente diferenciadas. Cada ponto colorido representa um isolado de begomovírus e cada agrupamento de pontos de uma dada cor representa uma subpopulação. A similaridade genética entre as subpopulações virais assumidas está representada em escala na figura.

Na última simulação foram assumidas oito subpopulações geneticamente diferenciadas (Figura 7). A subpopulação 8.1 foi compreendida por 179 isolados brasileiros da espécie *Bean golden mosaic virus* (BGMV). A subpopulação 8.2 foi constituída por 352 isolados brasileiros da espécie *Euphorbia yellow mosaic virus* (EuYMV). Já a subpopulação 8.3 foi composta por 228 isolados da espécie africana *African cassava mosaic virus* (ACMV). A subpopulação 8.4 foi compreendida por 1.513 isolados nativos do Velho Mundo das espécies *Pepper yellow vein virus* (PepYVV), *Tomato leaf curl virus* (ToLCV), *Cotton leaf curl virus* (CLCuV), *Bhendi yellow vein mosaic virus* (BYVMV), *Malvastrum yellow vein virus* (MaYVV) e *Papaya leaf curl virus* (PaLCuV). Já a subpopulação 8.5 foi composta por 771 isolados coletados nas Américas e pertencentes às espécies *Rhynchosia golden mosaic virus* (RhGMV), *Tomato golden vein virus* (TGVV) e *Macroptilium yellow spot virus* (MaYSV). A subpopulação 8.6 foi compreendida por 213 isolados da espécie *Sweet potato leaf curl vírus* (SPLCV), coletados predominantemente em países do Velho Mundo. A subpopulação 8.7 incluiu apenas 24 isolados da espécie *Corchorus golden mosaic vírus* (CoGMV), coletados em países do Velho Mundo. Finalmente, a subpopulação 8.8 foi compreendida por 527 isolados africanos das espécies *East African cassava mosaic virus* (EACMV) e *South African cassava mosaic virus* (SACMV).

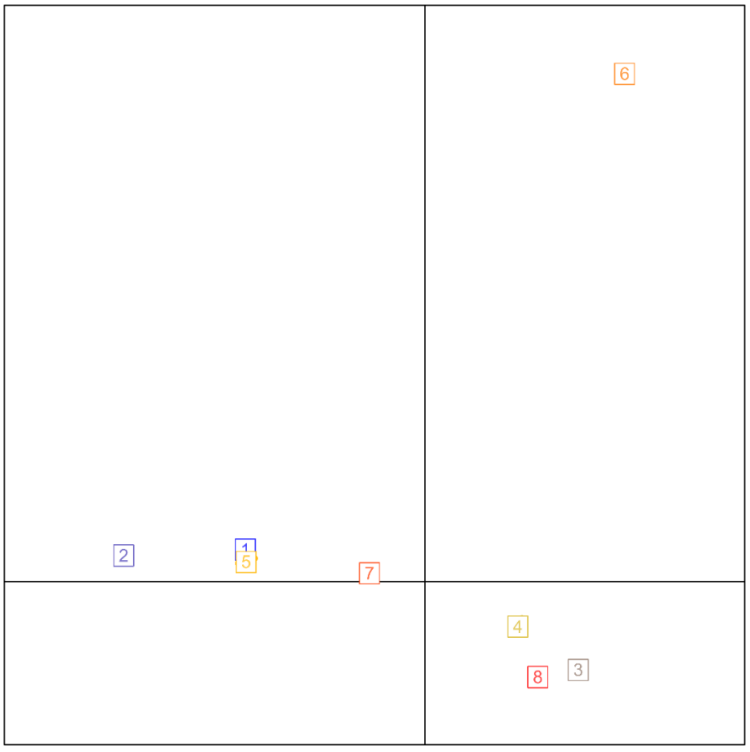


Figura 7. Gráfico de dispersão da análise estatística multivariada de subdivisão da metapopulação global de begomovírus baseada em sequências completas de DNA-A. Na simulação acima, foram assumidas oito grandes subpopulações geneticamente diferenciadas. Cada ponto colorido representa um isolado de begomovírus e cada agrupamento de pontos de uma dada cor representa uma subpopulação. A similaridade genética entre as subpopulações virais assumidas está representada em escala na figura.

4.2. Padrões de recombinação em genomas de begomovírus assumindo-se duas subpopulações geneticamente diferenciadas

Quando a metapopulação global de begomovírus foi dividida em duas subpopulações, houve a segregação dos isolados virais nativos do Velho e do Novo Mundo. Para cada uma dessas subpopulações foram determinados os números de sítios de recombinação por janelas móveis de 200 nucleotídeos de comprimento, que percorreram toda a extensão dos genomas virais. Dessa forma, foi possível detectar regiões genômicas com alta propensão à ocorrência de recombinação, aqui denominadas "hotspots" de recombinação.

Os mapas de distribuição de sítios de recombinação dos begomovírus nativos do Velho e do Novo Mundo (Figuras 8a e 8b, respectivamente) indicaram padrões similares de recombinação, onde os "hotspots" foram detectados em posições equivalentes dos genomas virais: nas porções 5' e 3' da região comum que contém origem de replicação viral e na porção central do gene *rep*. Esses resultados indicam que as subpopulações de begomovírus do Velho e Novo Mundo apresentam padrões conservados de recombinação. Para os vírus do Velho Mundo foi encontrado 458 eventos de recombinação, e para os vírus do Velho Mundo encontrou-se 162 eventos de recombinação.

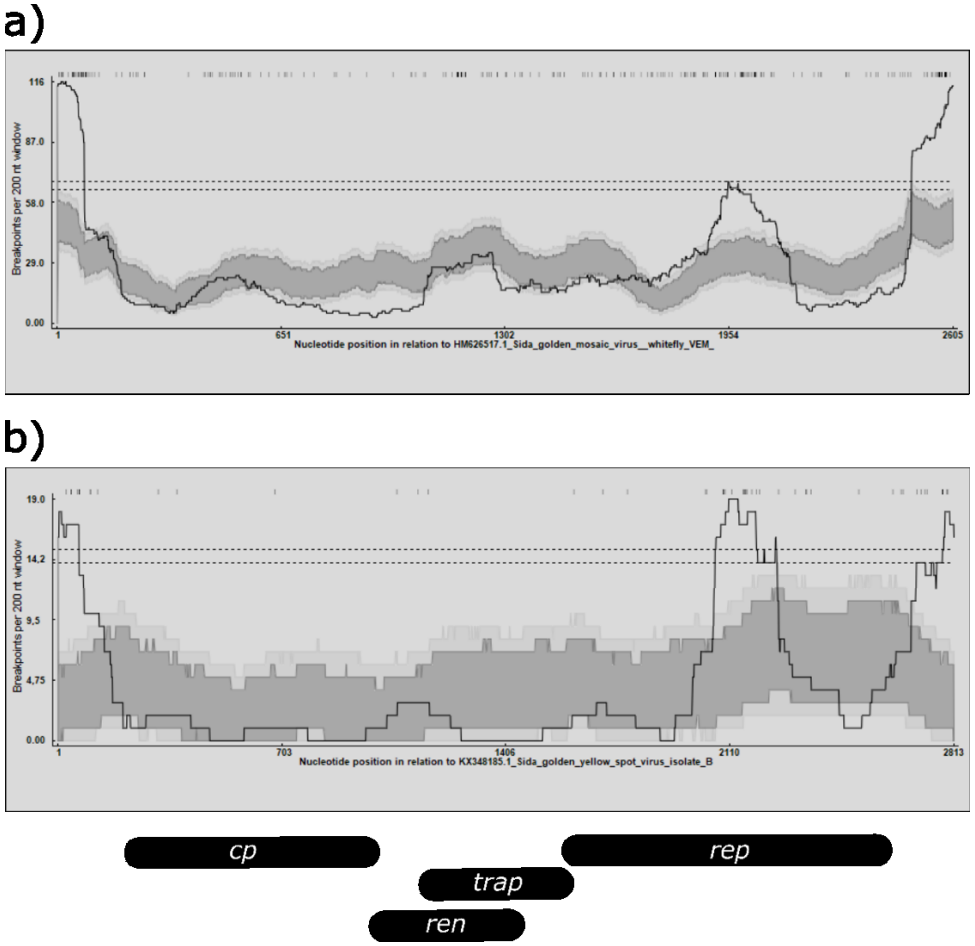


Figura 8. Mapas de densidade de sítios de recombinação construídos no programa "Recombination Detection Program" (RDP) para duas subpopulações assumidas nas análises discriminantes de componentes principais. Padrões de recombinação em genomas de begomovírus nativos do (**a**) Velho Mundo (**n* = 2.505) e (**b**) Novo Mundo (*n* = 1.302). Pontos da curva que interceptam as linhas tracejadas horizontais (limites de confiança de 95 e 99% determinados por meio do teste de permutação) são considerados "hotspots" de recombinação. O eixo 'x' representa os genomas virais linearizados iniciando-se a partir do dinucleotídeo 'AC' do nonanucleotídeo conservado em geminivírus. O eixo 'y' representa o número de sítios (breakpoints) de recombinação por janela móvel de 200 nucleotídeos. A organização dos genes virais ao longo do DNA-A é apresentada na parte inferior da figura, sendo que porção 5' da região comum localiza-se à esquerda do gene *cp*, enquanto que a porção 3' da mesma localiza-se à direita do gene *rep*.

*Número de isolados virais que compõem a subpopulação viral.

4.3. Padrões de recombinação em genomas de begomovírus assumindo-se três subpopulações geneticamente diferenciadas

Para aumentar o nível de resolução da caracterização dos padrões de recombinação em subpopulações geneticamente diferenciadas, foram realizadas simulações assumindo-se um número maior de subpopulações (K=3). Em constrate aos resultados obtidos na simulação de duas subpopulações (K=2), os mapas de distribuição de sítios de recombinação assumindo três subpopulações apresentaram divergências consideráveis. Todas as três subpopulações apresentaram um "hotspot" de recombinação na porção 3' da região comum (Figuras 9a-c). Por outro lado, um "hotspot" foi detectado na porção 5' da região comum somente nas subpopulações 3.1 e 3.3 (Figuras 9a e 9c, respectivamente). Um terceiro "hotspot" de recombinação na porção central do gene *rep* foi detectado somente nas subpopulações 3.2 e 3.3 (Figuras 9b e 9c, respectivamente). Esses resultados sugerem que, em um nível mais detalhado de segregação da metapopulação, certas subpopulações virais podem experimentar padrões distintos de recombinação. Foi detectado para a subpopulação 3.1 96 eventos de recombinação, para 3.2 85 eventos de recombinação e 3.3 283 eventos de recombinação.

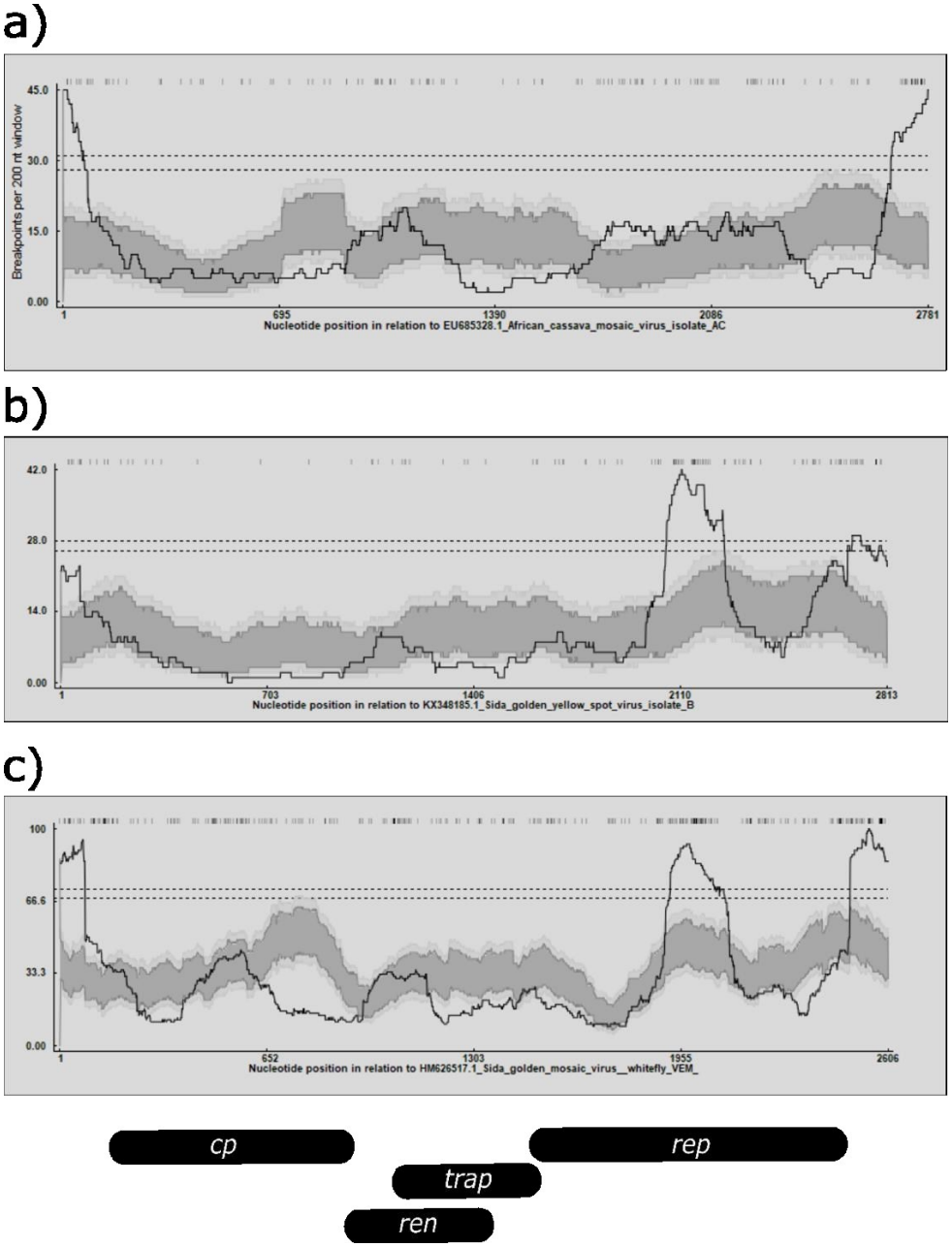


Figura 9. Mapas de distribuição de sítios de recombinação construídos no programa "Recombination Detection Program" (RDP) para três subpopulações assumidas nas análises discriminantes de componentes principais. Padrões de recombinação em genomas de begomovírus das subpopulações: (**a**) 3.1 (*n = 999), (**b**) 3.2 (n = 1.302) e (**c**) 3.3 (n = 1.506). Pontos da curva que interceptam as linhas tracejadas horizontais (limites de confiança de 95 e 99% determinados por meio do teste de permutação) são considerados "hotspots" de recombinação. O eixo 'x' representa os genomas virais linearizados iniciando-se a partir do dinucleotídeo 'AC' do nonanucleotídeo conservado em geminivírus. O eixo 'y' representa o número de sítios (breakpoints) de recombinação por janela móvel de 200 nucleotídeos. A organização dos genes virais ao longo do DNA-A é apresentada na parte inferior da figura, sendo que porção 5' da região comum localiza-se à esquerda do gene *cp*, enquanto que a porção 3' da mesma localiza-se à direita do gene *rep*.

*Número de isolados virais que compõem a subpopulação viral.

4.4. Padrões de recombinação em genomas de begomovírus assumindo-se quatro subpopulações geneticamente diferenciadas

Para os mapas de distribuição de sítios de recombinação, assumindo-se quatro subpopulações virais, foi detectado somente um "hotspot" na subpopulação 4.1 (Figura 10a), localizado na porção mediana do genoma, onde estão os genes sobrepostos *ren* e *trap*. Nas demais subpopulações (Figuras 10b-d) foram detectados "hotspots" nas porções 5' e 3' da região comum. Em adição, um "hotspot" de recombinação presente na porção inicial do gene *rep* foi detectado somente na subpopulação 4.3 (Figura 10c). Para a subpopulação 4.1 foi detectado 2617 eventos de recombinação, nas subpopulações 4.2 foi detectado 602 eventos de recombinação, enquanto que para 4.3 houve 54 eventos de recombinação e 4.4 houve 224 eventos de recombinação.

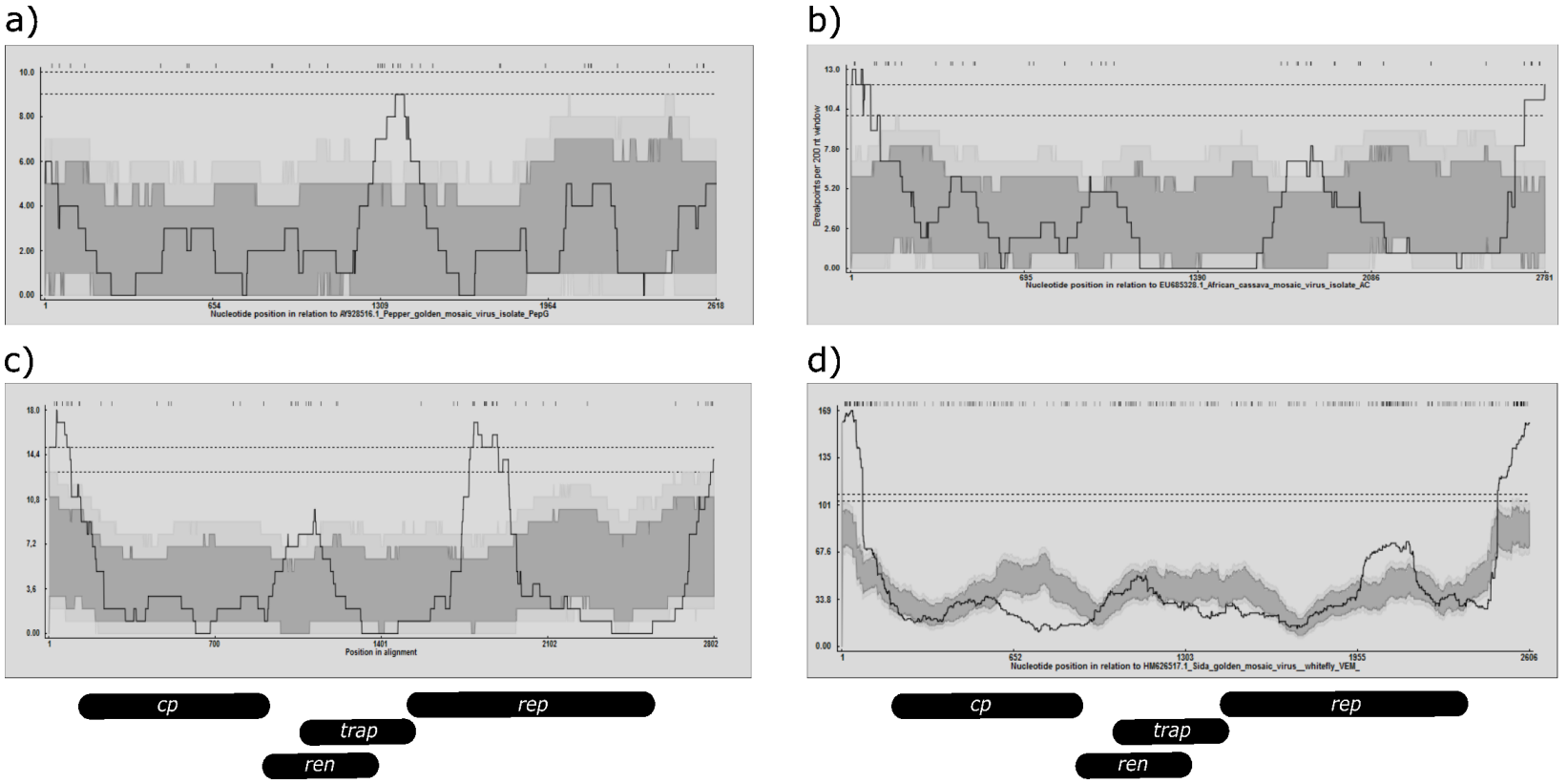


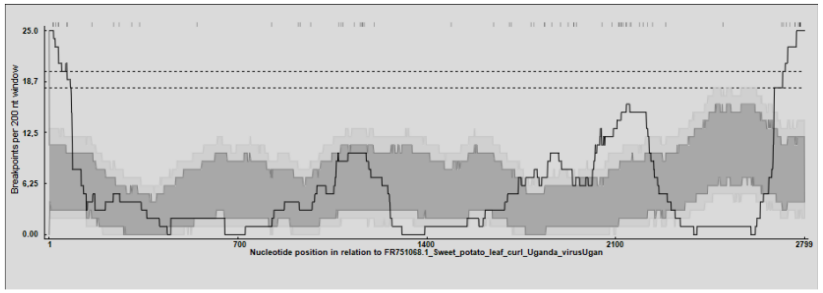
Figura 10. Mapas de distribuição de sítios de recombinação construídos no programa "Recombination Detection Program" (RDP) para quatro subpopulações assumidas nas análises discriminantes de componentes principais. Padrões de recombinação em genomas de begomovírus das subpopulações: (**a**) 4.1 (*n = 443), (**b**) 4.2 (n = 859), (**c**) 4.3 (n = 760) e (**d**) 4.4 (n = 1.745). Pontos da curva que interceptam as linhas tracejadas horizontais (limites de confiança de 95 e 99% determinados por meio do teste de permutação) são considerados "hotspots" de recombinação. O eixo 'x' representa os genomas virais linearizados iniciando-se a partir do dinucleotídeo 'AC' do nonanucleotídeo conservado em geminivírus. O eixo 'y' representa o número de sítios (breakpoints) de recombinação por janela móvel de 200 nucleotídeos. A organização dos genes virais ao longo do DNA-A é apresentada na parte inferior da figura, sendo que porção 5' da região comum localiza-se à esquerda do gene *cp*, enquanto que a porção 3' da mesma localiza-se à direita do gene *rep*.

*Número de isolados virais que compõem a subpopulação viral.

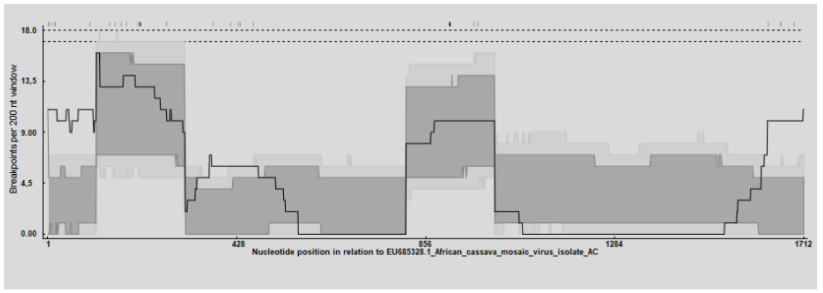
4.5. Padrões de recombinação em genomas de begomovírus assumindo-se cinco subpopulações geneticamente diferenciadas

Para os mapas de distribuição de sítios de recombinação, assumindo-se cinco subpopulações, observa-se que foram detectados "hotspots" de recombinação somente em isolados das subpopulações 5.1, 5.3 e 5.4 (Figuras 11a e 11c-d, respectivamente). Em isolados de ambas as subpopulações foram detectados "hotspots" nas porções 5' e 3' da região comum; entretanto, a subpopulação 5.4 (Figura 11d) apresentou um "hotspot" adicional localizado na porção mediana do gene *rep*. Para a subpopulação 5, na primeira subdivisão, houve 127 eventos de recombinação, na segunda houve 1711 eventos de recombinação, na terceira 5 eventos de recombinação, na quarta 2723 eventos de recombinação e na quinta 2605 eventos de recombinação.

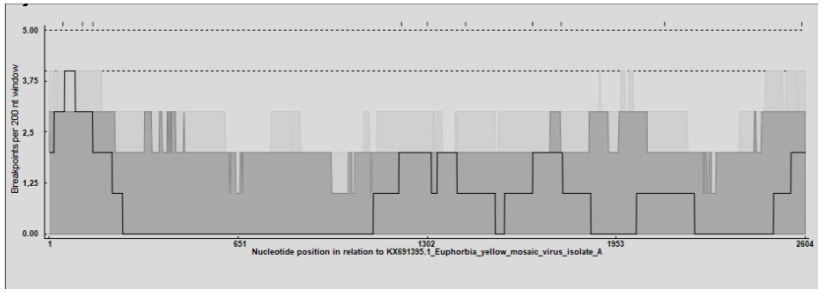
a)


Breakpoints per 200 nt window
25.0
18.7
12.5
6.25
0.00
1
700
1400
2100
2799
Nucleotide position in relation to FR751068.1_Sweet_potato_leaf_curl_Uganda_virusUgan

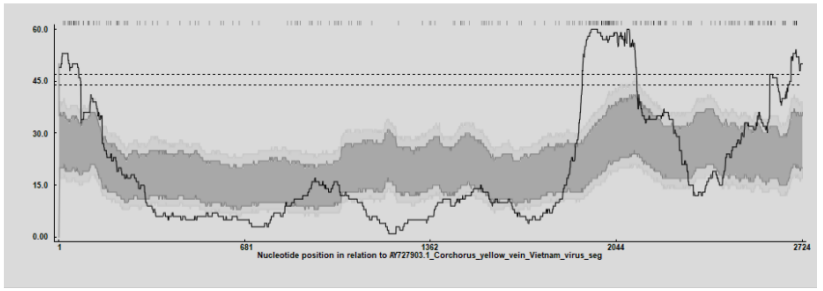
b)

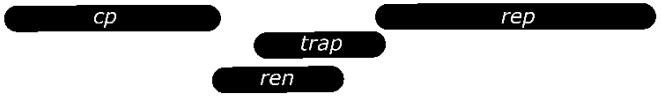

Breakpoints per 200 nt window
18.0
13.5
9.00
4.5
0.00
1
428
856
1284
1712
Nucleotide position in relation to EU685328.1_African_cassava_mosaic_virus_isolate_AC

c)

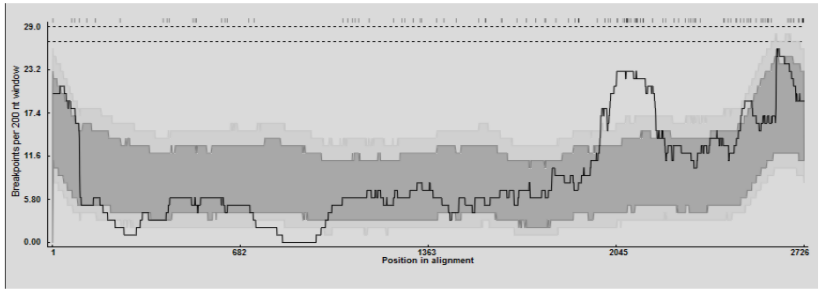

Breakpoints per 200 nt window
5.00
3.75
2.5
1.25
0.00
1
651
1302
1953
2604
Nucleotide position in relation to KX691385.1_Euphorbia_yellow_mosaic_virus_isolate_A

d)


60.0
45.0
30.0
15.0
0.00
1
681
1362
2044
2724
Nucleotide position in relation to JF727903.1_Corchorus_yellow_vein_Vietnam_virus_seg


cp
rep
trap
ren

e)


Breakpoints per 200 nt window
29.0
23.2
17.4
11.6
5.80
0.00
1
682
1363
2045
2726
Position in alignment

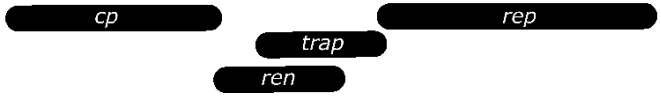

cp
rep
trap
ren

Figura 11. Mapas de distribuição de sítios de recombinação construídos no programa "Recombination Detection Program" (RDP) para cinco subpopulações assumidas nas análises discriminantes de componentes principais. Padrões de recombinação em genomas de begomovírus das subpopulações: (**a**) 5.1 (**n* = 213), (**b**) 5.2 (*n* = 760), (**c**) 5.3 (*n* = 352), (**d**) 5.4 (*n* = 974) e (**e**) 5.5 (*n* = 1.508). Pontos da curva que interceptam as linhas tracejadas horizontais (limites de confiança de 95 e 99% determinados por meio do teste de permutação) são considerados "hotspots" de recombinação. O eixo 'x' representa os genomas virais linearizados iniciando-se a partir do dinucleotídeo 'AC' do nonanucleotídeo conservado em geminivírus. O eixo 'y' representa o número de sítios (breakpoints) de recombinação por janela móvel de 200 nucleotídeos. A organização dos genes virais ao longo do DNA-A é apresentada na parte inferior da figura, sendo que porção 5' da região comum localiza-se à esquerda do gene *cp*, enquanto que a porção 3' da mesma localiza-se à direita do gene *rep*.

*Número de isolados virais que compõem a subpopulação viral.

4.6. Padrões de recombinação em genomas de begomovírus assumindo-se seis subpopulações geneticamente diferenciadas

Quando foram assumindas seis subpopulações, também se observou divergências entre os padrões de recombinação. "Hotspots" localizados na porção 3' da região comum foram detectados em isolados das subpopulações 6.1, 6.3, 6.4, 6.5 e 6.6 (Figuras 12a, 12c-e e 12f, respectivamente). Por outro lado, "hotspots" presentes na porção 5' da região comum foram detectados isolados das subpopulações 6.4, 6.5 e 6.6 (Figuras 12d-f). Somente isolados da subpopulação 6.3 (Figura 12c) apresentaram um "hotspot" na porção central do gene *rep*. Para a subpopulação 6, na primeira subdivisão foi encontrado 458 eventos de recombinação, na segunda 42 eventos de recombinação, na terceira 514 eventos de recombinação, na quarta 246 eventos de recombinação, na quinta 4 eventos de recombinação e na sexta 98 eventos de recombinação.

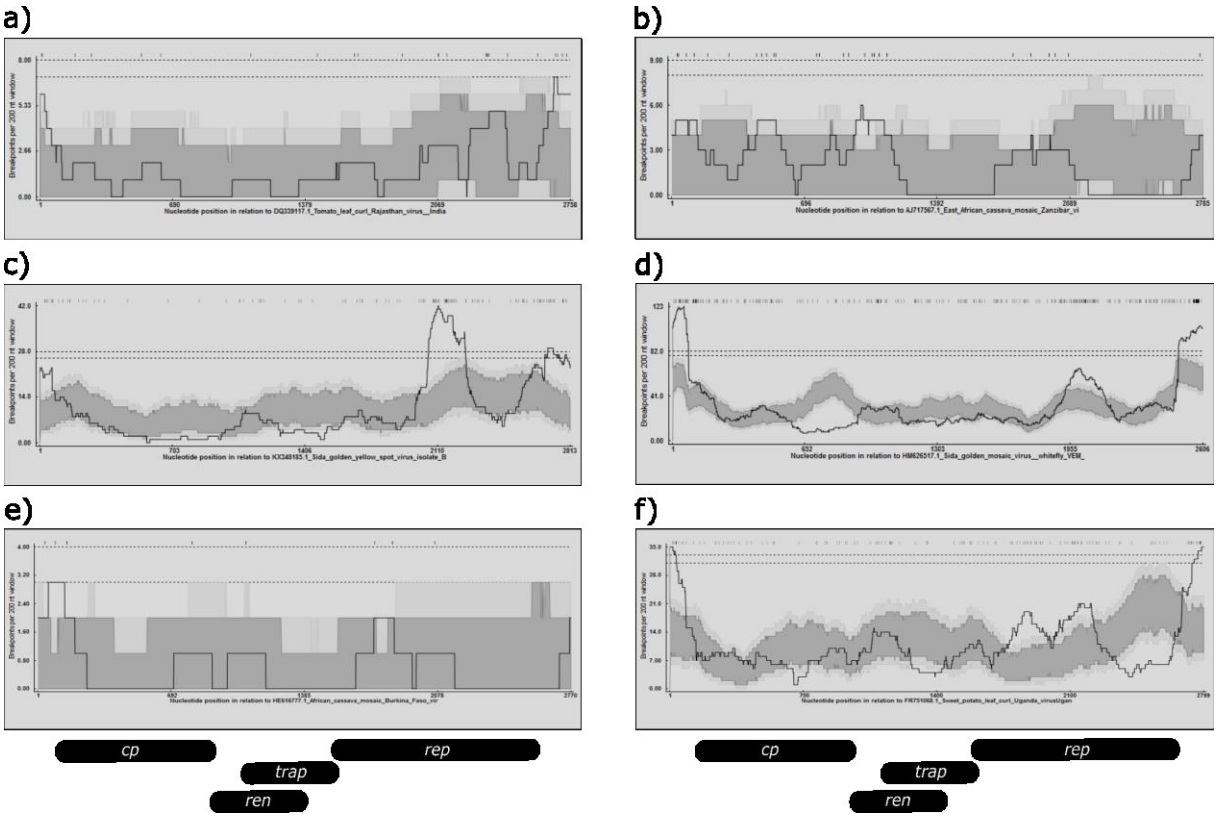


Figura 12. Mapas de distribuição de sítios de recombinação construídos no programa "Recombination Detection Program" (RDP) para seis subpopulações assumidas nas análises discriminantes de componentes principais. Padrões de recombinação em genomas de begomovírus das subpopulações: (**a**) 6.1 (*n = 74), (**b**) 6.2 (n = 527), (**c**) 6.3 (n = 1.302), (**d**) 6.4 (n = 1.463), (**e**) 6.5 (n = 228) e (**f**) 6.6 (n = 213). Pontos da curva que interceptam as linhas tracejadas horizontais (limites de confiança de 95 e 99% determinados por meio do teste de permutação) são considerados "hotspots" de recombinação. O eixo 'x' representa os genomas virais linearizados iniciando-se a partir do dinucleotídeo 'AC' do nonanucleotídeo conservado em geminivírus. O eixo 'y' representa o número de sítios (breakpoints) de recombinação por janela móvel de 200 nucleotídeos. A organização dos genes virais ao longo do DNA-A é apresentada na parte inferior da figura, sendo que porção 5' da região comum localiza-se à esquerda do gene *cp*, enquanto que a porção 3' da mesma localiza-se à direita do gene *rep*.

*Número de isolados virais que compõem a subpopulação viral.

4.7. Padrões de recombinação em genomas de begomovírus assumindo-se sete subpopulações geneticamente diferenciadas

Para os mapas de distribuição de sítios de recombinação assumindo sete subpopulações, somente isolados das subpopulações 7.1, 7.2 e 7.6 (Figuras 13a-b e 13f, respectivamente) apresentaram "hotspots" de recombinação. Isolados das subpopulações 7.1 e 7.6 (Figuras 13a e 13f, respectivamente) apresentaram "hotspots" de recombinação nas porções 5' e 3' da região comum. A subpopulação 7.1 (Figura 13a) foi a única a apresentar um "hotspot" na região codificadora do gene *rep*. É importante enfatizar que todos os "hotspots" detectados ao longo das simulações, assumindo de 2 até 6 subpopulações virais, localizaram-se predominantemente na região comum e/ou na região codificadora do gene *rep*. Por outro lado, similar ao padrão apresentado por isolados da subpopulação 4.1 (Figura 10a), isolados da subpopulação 7.2 (Figura 13b) também apresentaram um "hotspot" localizado na região de sobreposição dos genes *ren* e *trap*. Para a subdivisão 7 das subpopulações, na primeira foi identificado 121 eventos de recombinação, na segunda 252 eventos de recombinação, na terceira 2801 eventos de recombinação, na quarta 17 eventos de recombinação, na quinta 146 eventos de recombinação, na sexta 53 eventos de recombinação e na sétima 16 eventos de recombinação.

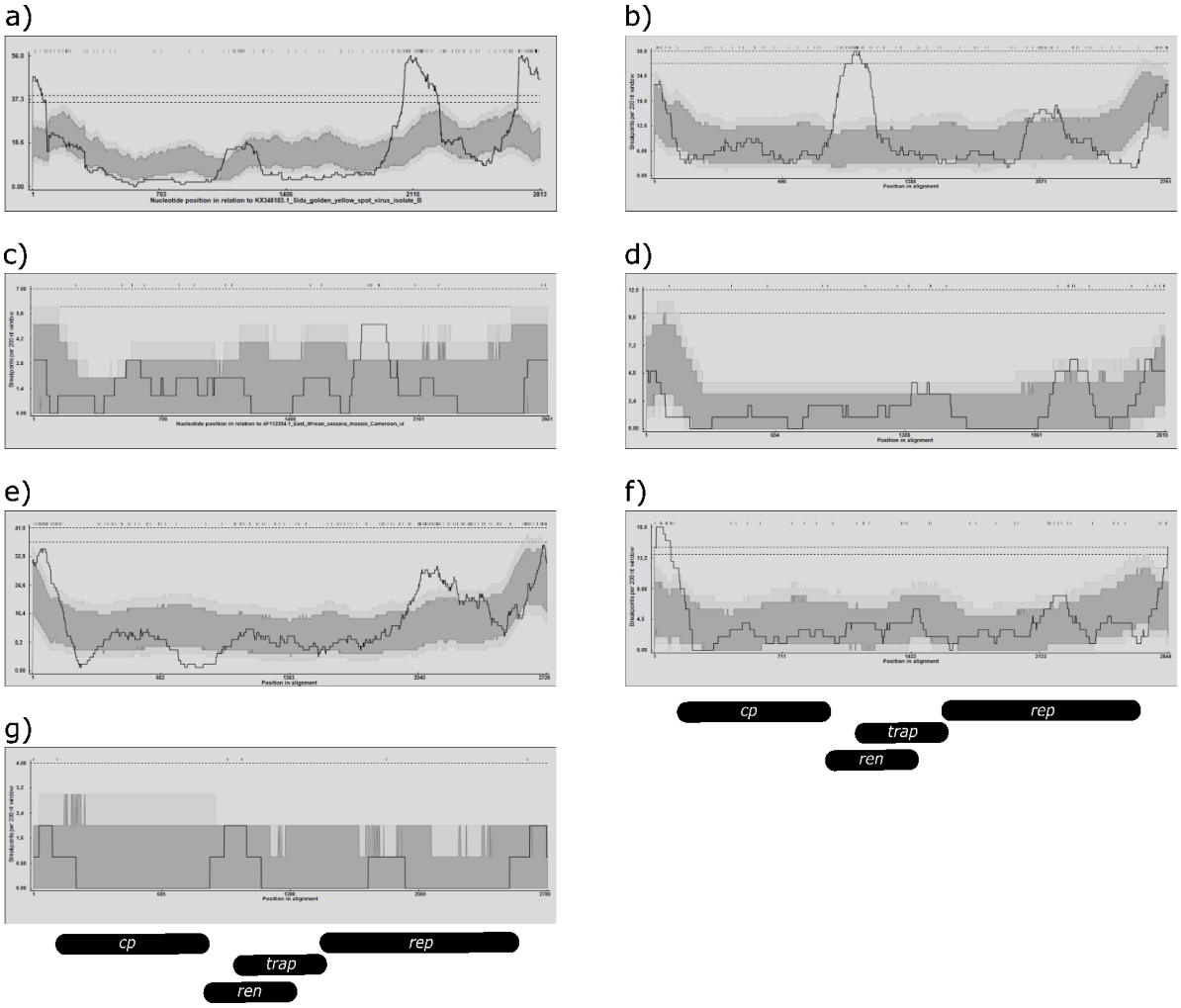


Figura 13. Mapas de distribuição de sítios de recombinação construídos no programa "Recombination Detection Program" (RDP) para sete subpopulações assumidas nas análises discriminantes de componentes principais. Padrões de recombinação em genomas de begomovírus das subpopulações: (**a**) 7.1 (*n = 866), (**b**) 7.2 (n = 429), (**c**) 7.3 (n = 282), (**d**) 7.4 (n = 436), (**e**) 7.5 (n = 1.104), (**f**) 7.6 (n = 213) e (**g**) 7.7 (n = 477). Pontos da curva que interceptam as linhas tracejadas horizontais (limites de confiança de 95 e 99% determinados por meio do teste de permutação) são considerados "hotspots" de recombinação. O eixo 'x' representa os genomas virais linearizados iniciando-se a partir do dinucleotídeo 'AC' do nonanucleotídeo conservado em geminivírus. O eixo 'y' representa o número de sítios (breakpoints) de recombinação por janela móvel de 200 nucleotídeos. A organização dos genes virais ao longo do DNA-A é apresentada na parte inferior da figura, sendo que porção 5' da região comum localiza-se à esquerda do gene *cp*, enquanto que a porção 3' da mesma localiza-se à direita do gene *rep*.

*Número de isolados virais que compõem a subpopulação viral.

4.8. Padrões de recombinação em genomas de begomovírus assumindo-se oito subpopulações geneticamente diferenciadas

Os padrões de recombinação observados quando foram assumindas oito subpopulações também apresentaram diferenças marcantes. “Hotspots” de recombinação foram detectados somente nas porções 5’ e 3’ da região comum dos isolados das subpopulações 8.2, 8.4, 8.5, 8.6 e 8.8 (Figuras 14b, 14d, 14e-f e 14h, respectivamente). É importante notar que, devido ao menor número de isolados de algumas subpopulações, “hotspots” foram detectados a partir de poucos sítios de recombinação como, por exemplo, na subpopulação 8.4, em que os “hotspots” apresentaram somente 5 sítios de recombinação. Juntos, os resultados apresentados neste estudo corroboram a afirmação de que subpopulações virais geograficamente isoladas são afetadas de formas distintas pelo mecanismo de recombinação. Para a subpopulação 8, na subdivisão 8.1 houve 2611 eventos de recombinação, na 8.2 ocorreu 2609 eventos de recombinação, na 8.3 ocorreu 2779 eventos de recombinação, na 8.4 ocorreu 2725 eventos de recombinação, na 8.5 ocorreu 2581 eventos de recombinação, na 8.6 ocorreu 53 eventos de recombinação, na 8.7 houve 5 eventos de recombinação e na 8.8 houve 2843 eventos de recombinação.

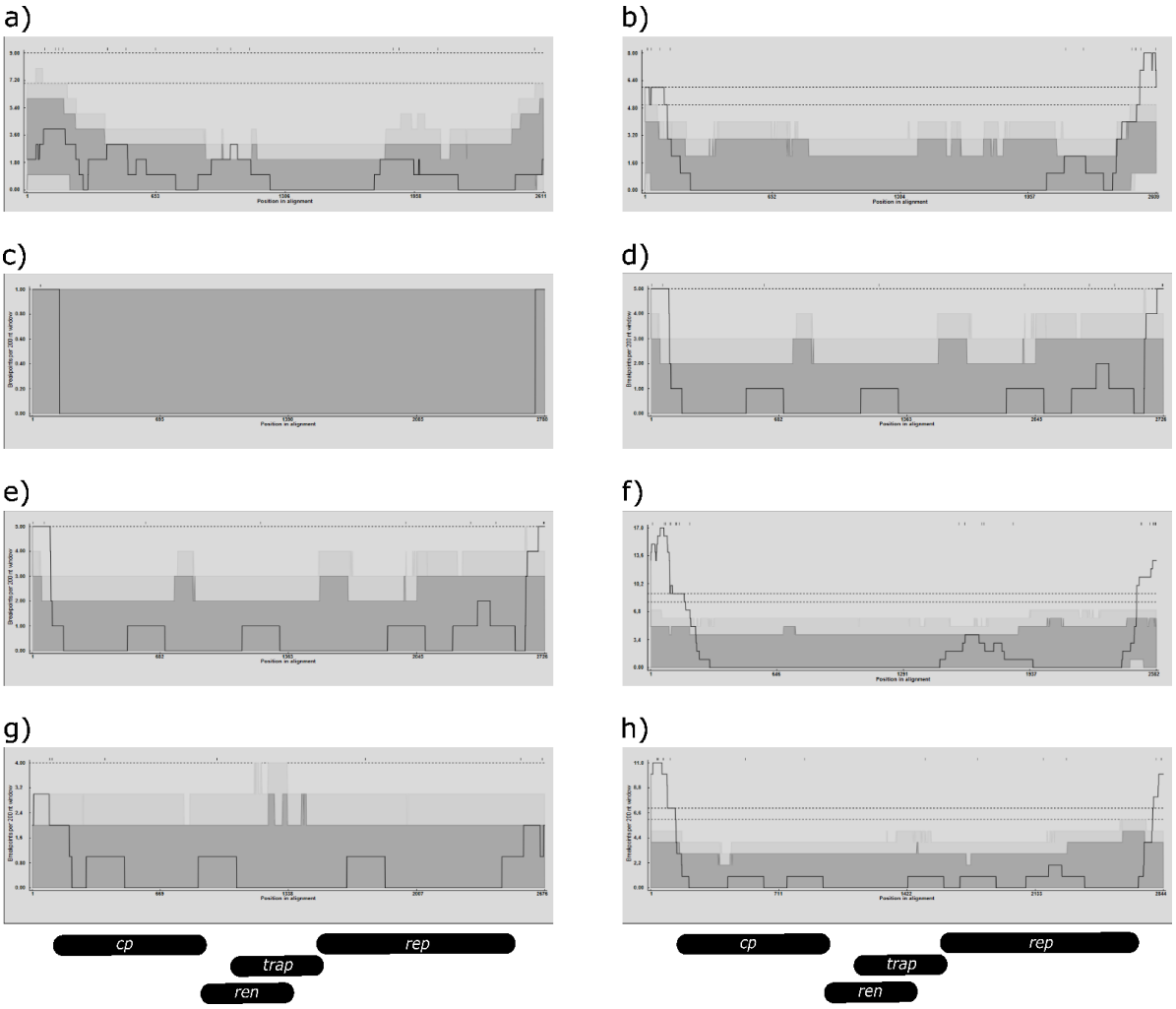


Figura 14. Mapas de distribuição de sítios de recombinação construídos no programa "Recombination Detection Program" (RDP) para oito subpopulações assumidas nas análises discriminantes de componentes principais. Padrões de recombinação em genomas de begomovírus das subpopulações: (**a**) 8.1 (*n = 179), (**b**) 8.2 (n = 352), (**c**) 8.3 (n = 228), (**d**) 8.4 (n = 1.513), (**e**) 8.5 (n = 771), (**f**) 8.6 (n = 213), (**g**) 8.7 (n = 24) e (**h**) 8.8 (n = 527). Pontos da curva que interceptam as linhas tracejadas horizontais (limites de confiança de 95 e 99% determinados por meio do teste de permutação) são considerados "hotspots" de recombinação. O eixo 'x' representa os genomas virais linearizados iniciando-se a partir do dinucleotídeo 'AC' do nonanucleotídeo conservado em geminivírus. O eixo 'y' representa o número de sítios (breakpoints) de recombinação por janela móvel de 200 nucleotídeos. A organização dos genes virais ao longo do DNA-A é apresentada na parte inferior da figura, sendo que porção 5' da região comum localiza-se à esquerda do gene *cp*, enquanto que a porção 3' da mesma localiza-se à direita do gene *rep*.

*Número de isolados virais que compõem a subpopulação viral.

5. DISCUSSÃO

A recombinação é um dos principais mecanismos responsáveis pela evolução de populações virais, sendo capaz de gerar variabilidade em um curto espaço de tempo por meio da formação de novas combinações genotípicas de variantes virais, geradas primariamente pelo mecanismo de mutação (Roossinck, 1997; García-Arenal *et al.*, 2003; García-Andrés *et al.*, 2007b; Vinutha *et al.*, 2014). A ocorrência de recombinação em populações de vírus de plantas tem sido exaustivamente estudada ao longo dos últimos anos devido à grande disponibilidade de sequências completas de genomas virais (Rishishwar *et al.*, 2015; De Bruyn *et al.*, 2016; Lima *et al.*, 2017; Vinoth Kumar *et al.*, 2017). Somado a isso, houve um progresso marcante no desenvolvimento de ferramentas computacionais capazes não somente de detectar, mas também caracterizar os padrões de recombinação em genomas de isolados virais obtidos de diferentes tipos de hospedeiros. Trabalhos prévios confirmam a importância desse mecanismo evolutivo na adaptação viral permitindo a ampliação da gama de hospedeiros e suplantação da resistência genética de plantas (Monci *et al.*, 2002; Seal *et al.*, 2006a).

A diversificação de alguns vírus plantas parece depender fortemente da recombinação (Lima *et al.*, 2017). Os begomovírus compreendem um grupo numeroso de fitopatógenos, cuja importância aumentou significativamente nas últimas décadas em vários países (Inoue-Nagata *et al.*, 2016; Kumar *et al.*, 2017b; Nagendran *et al.*, 2017; Barboza *et al.*, 2018). O surgimento e emergência de várias espécies é, pelo menos em parte, consequência da ocorrência frequente de recombinação (Padidam *et al.*, 1999; Lima *et al.*, 2017). O conhecimento acerca dos fatores que favorecem a ocorrência de recombinação é de suma importância para entender o surgimento desses vírus e, principalmente, nortear as pesquisas visando seu controle em nível de campo (Seal *et al.*, 2006a).

Os mecanismos genéticos e bioquímicos envolvidos na alta frequência de recombinação em populações de begomovírus são desconhecidos, entretanto, duas hipóteses são amplamente discutidas na literatura. A primeira hipótese sugere que a replicação de begomovírus depende de um mecanismo conhecido como "replicação dependente de recombinação". A segunda hipótese sugere que, devido ao fato da replicação do genoma e da transcrição dos genes virais ocorrer em sentidos opostos, há choques frequentes entre os complexos de replicação e transcrição. Como consequência desses choques, o molde utilizado na replicação viral poderia ser trocado permitindo a formação de genomas recombinantes (Lefeuvre *et al.*, 2007; Monjane *et al.*, 2012; Shahid *et al.*, 2017). Em ambas as hipóteses, a ocorrência de recombinação depende da coinfecção de uma planta hospedeira por dois ou mais begomovírus. Em concordância,

vários estudos demonstram que infecções mistas entre estirpes ou mesmo espécies distintas de begomovírus são eventos relativamente comuns em condições de campo (Méndez-Lozano *et al.*, 2003; García-Andrés *et al.*, 2007a; Nagendran *et al.*, 2017).

Lefeuvre *et al.* (2009) analisaram a frequência de recombinação ao longo de genomas de vários grupos distintos de vírus de DNA de fita simples (circovírus, microvírus, parvovírus, nanovírus e geminivírus). Neste estudo foi demonstrado que a sequência codificadora da proteína Rep e a região intergênica, também conhecida como região comum em begomovírus bipartidos, são alvos frequentes de recombinação. Com base nesses resultados, os autores concluíram que há um padrão evolutivamente conservado de recombinação em populações de vírus de DNA de fita simples. Embora esse estudo tenha sido realizado com base em um número considerável de genomas virais, os autores não verificaram se esse padrão de recombinação também era conservado entre subpopulações virais isoladas geograficamente.

Prasanna *et al.* (2010) empregaram um método bayesiano para determinação da estrutura genética da metapopulação global de begomovírus e demonstram a existência de, pelo menos, sete grandes subpopulações virais estruturadas com base em local de coleta. No presente estudo, a estrutura genética da metapopulação global de begomovírus, representada por um conjunto de dados compreendendo mais de 3.800 sequências completas de DNA-A, foi determinada por meio de uma abordagem baseada em estatística multivariada e foram caracterizados os padrões de recombinação observados em cada uma das grandes subpopulações virais identificadas. Para aumentar a robustez da análise comparativa dos padrões de recombinação, foram realizadas diferentes simulações com números crescentes de subpopulações (k = 2 até k = 8).

No presente estudo, a estrutura genética da metapopulação global de begomovírus, representada por um conjunto de dados muito maior, compreendendo mais de 3.800 sequências completas de DNA-A ou equivalente. As subpopulações foram determinadas por meio de uma abordagem baseada em estatística multivariada, diferente do que é visto na pesquisa de Prasanna et al., e foram caracterizados os padrões de recombinação observados em cada uma das grandes subpopulações virais identificadas. Para aumentar a robustez da análise comparativa dos padrões de recombinação, foram realizadas diferentes simulações com números crescentes de subpopulações (k = 2 até k = 8), simulando o número de subpopulações identificado como ótimo pelo mesmo autor. A análise comparativa dos padrões de recombinação observados sob diferentes cenários populacionais simulados, indica que há divergências evolutivas marcantes em termos de recombinação em subpopulações específicas da metapopulação global dos begomovírus. Portanto, o presente estudo mostra pela primeira vez que subpopulações distintas de begomovírus experimentam diferentes dinâmicas de

recombinação. Essas informações fornecem subsídios importantes, principalmente para programas de melhoramento genético visando resistência aos begomovírus, indicando que as estratégias de geração de novas variedades devem ser específicas para as regiões globais de abrangência de cada uma das principais subpopulações de begomovírus.

6. CONCLUSÕES

Nesse estudo, foi demonstrado que subpopulações de begomovírus podem experimentar quatro tipos de padrões recombinantes:

i. O primeiro, no qual há ausência completa de "hotspots", sugerindo que os sítios de recombinação estão uniformemente distribuídos ao longo do genoma e, portanto, sinalizam que não há uma região genômica preferencialmente afetada por recombinação.
ii. O segundo padrão recombinante refere-se àqueles isolados nos quais foram detectados "hotspots" de recombinação na porção 5' e/ou 3' da região comum.
iii. O terceiro padrão compreende isolados de subpopulações nos quais foi detectado um "hotspot" de recombinação na região codificadora do gene *rep*.
iv. Por fim; em simulações distintas, conjuntos de isolados de duas subpopulações apresentaram "hotspots" na região de sobreposição dos genes *ren* e *trap*.

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ANEXOS

Tabela 1. Isolados de begomovírus analisados nesse estudo

Virus	Geographical Origin	Host	GenBank accession#
Abutilon golden mosaic Yucatan virus	Mexico	*Abutilon permolle*	KC430935
Abutilon mosaic Bolivia virus	Bolivia	*Abutilon sp.*	HM585445
Abutilon mosaic Brazil virus	Brazil	*Sida rhomboidea*	JF694482
Abutilon mosaic Brazil virus	Brazil	*Sida rhomboidea*	JF694480
Abutilon mosaic Brazil virus	Brazil	*Sida rhomboidea*	JF694481
Abutilon mosaic virus	USA	*Abutilon*	U51137
Abutilon mosaic virus	India	*Abutilon*	HQ588900
Abutilon mosaic virus	India	*Abutilon*	HQ588899
Abutilon mosaic virus	India	*Abutilon*	HQ588901
Abutilon mosaic virus	Germany	*Abutilon*	X15983
Abutilon mosaic virus	Germany	*Abutilon*	LN611622
Abutilon mosaic virus	France	*Abutilon*	LN611623
African cassava mosaic Burkina Faso virus	Burkina Faso	*Manihot esculenta*	HE616777
African cassava mosaic Burkina Faso virus	Burkina Faso	*Manihot esculenta*	HE616779
African cassava mosaic Burkina Faso virus	Burkina Faso	*Manihot esculenta*	HE616780
African cassava mosaic Burkina Faso virus	Burkina Faso	*Manihot esculenta*	HE616781
African cassava mosaic virus	Nigeria	*Combretum confertum*	EU685328
African cassava mosaic virus	Pakistan	*Nicotiana benthamiana*	GQ169505
African cassava mosaic virus	Democratic Republic of the Congo	*Manihot esculenta*	FN668378
African cassava mosaic virus	Angola	*Manihot esculenta cv. Mundele Paco*	FJ807631

African cassava mosaic virus	Tanzania	Not specified	AY795982
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887787
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887788
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887768
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887769
African cassava mosaic virus	Zambia	*Manihot esculenta*	KT869127
African cassava mosaic virus	Zambia	*Manihot esculenta*	KT869128
African cassava mosaic virus	Zambia	*Manihot esculenta*	KT869129
African cassava mosaic virus	Zambia	*Manihot esculenta*	KT869130
African cassava mosaic virus	Zambia	*Manihot esculenta*	KT869131
African cassava mosaic virus	Nigeria	*Senna occidentalis*	EU685322
African cassava mosaic virus	Nigeria	*Ricinus communis*	EU685324
African cassava mosaic virus	Nigeria	*Glycne max*	EU685325
African cassava mosaic virus	Burkina Faso	*Manihot esculenta*	FM877473
African cassava mosaic virus	Ghana	*Manihot esculenta*	JN165088
African cassava mosaic virus	Benin	*Manihot esculenta*	KR476371
African cassava mosaic virus	Togo	*Manihot esculenta*	KR476372
African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979760
African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979766
African cassava mosaic virus	Kenya	*Manihot esculenta*	HG530110
African cassava mosaic virus	Kenya	*Manihot esculenta*	HG530111
African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979758
African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979759
African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979768
African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979762

African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979763
African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979767
African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979764
African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979765
African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979761
African cassava mosaic virus	Nigeria	*Manihot glaziovii*	EU685318
African cassava mosaic virus	Nigeria	*Leucaena leucocephala*	EU685320
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887797
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887798
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887789
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887796
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888070
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888067
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888075
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888080
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888082
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888086
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887901
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888059
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887887
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887966
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888062
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888088
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888096
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887980

African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887858
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887899
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887900
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887837
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887907
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887911
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887822
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887833
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887977
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887821
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887828
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887823
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887824
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887832
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887844
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887860
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887861
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887854
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887863
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887974
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887975
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887842
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887914
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887865
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887884

African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888008
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887856
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887873
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887834
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887872
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887943
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887895
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887997
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887976
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887866
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887883
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887870
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887867
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887879
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887874
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887995
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887979
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887896
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887838
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887897
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887978
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887894
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887955
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887956
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887878

African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887954
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887891
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887835
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887836
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887875
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887849
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887852
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887906
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887898
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887904
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887905
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887912
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887877
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887913
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887846
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887882
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887850
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887847
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887908
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887909
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887910
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887881
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887843
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887880
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887889

African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887888
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887876
African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887893
African cassava mosaic virus	Pakistan	*Gossypium harknessii*	GQ204107
African cassava mosaic virus	Pakistan	*Gossypium tomentosum*	HM468428
African cassava mosaic virus	Pakistan	*Nicotiana benthamiana*	GQ204108
African cassava mosaic virus	Pakistan	*Nicotiana benthamiana*	GQ204106
African cassava mosaic virus	Pakistan	*Nicotiana benthamiana*	GQ204109
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	HE814062
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887770
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887801
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887774
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887775
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887759
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887760
African cassava mosaic virus	Democratic Republic of the Congo	*Pueraria javanica*	FN435272
African cassava mosaic virus	Democratic Republic of the Congo	*Pueraria javanica*	FN435274
African cassava mosaic virus	Democratic Republic of the Congo	*Centrosema pubescens*	FN435275
African cassava mosaic virus	Democratic Republic of the Congo	*Pueraria javanica*	FN435273
African cassava mosaic virus	Democratic Republic of the Congo	*Centrosema pubescens*	FN435277
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887777
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887778
African cassava mosaic virus	Chad	*Manihot esculenta*	KJ888098
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887793
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887794

African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887795
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887808
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887811
African cassava mosaic virus	Chad	*Manihot esculenta*	KJ888099
African cassava mosaic virus	Chad	*Manihot esculenta*	KJ888100
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887812
African cassava mosaic virus	Chad	*Manihot esculenta*	HE814065
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887803
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887809
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887757
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887806
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887807
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887804
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887804
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887753
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887754
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887810
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887802
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887755
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887758
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887805
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887761
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887762
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887771
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887790

African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887792
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887781
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887765
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887776
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887772
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887773
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887786
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887780
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887784
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887785
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887818
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887782
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887816
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887817
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887783
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887819
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887814
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887815
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887813
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887779
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887756
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887791
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887800
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887766
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887767

African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887763
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887764
African cassava mosaic virus	Central African Republic	*Manihot esculenta*	KJ887799
African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053427
African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053426
African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053422
African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053423
African cassava mosaic virus	Kenya	*Manihot esculenta*	JN053430
African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053424
African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053425
African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053429
African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053428
African cassava mosaic virus	Kenya	*Manihot esculenta*	JN053431
African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053421
African cassava mosaic virus	Uganda	Not specified	AF126802
African cassava mosaic virus	Uganda	*Manihot glaziovii*	AM502340
African cassava mosaic virus	Uganda	Not specified	AF126800
African cassava mosaic virus	Democratic Republic of the Congo	*Pueraria javanica*	FN435271
African cassava mosaic virus	Democratic Republic of the Congo	*Centrosema pubescens*	FN435276
African cassava mosaic virus	Uganda	Not specified	AM502338
African cassava mosaic virus	Uganda	Not specified	AM502339
Ageratum enation virus	India	*Solanum lycopersicum*	KP195264
Ageratum enation virus	Pakistan	*Mulberry*	LT716984
Ageratum enation virus	India	*Sunflower*	KY089033
Ageratum enation virus	Pakistan	*Turnip*	AM701770

Ageratum enation virus	Nepal	*Ageratum conyzoides*	AJ437618
Ageratum enation virus	India	*Trichosanthes dioica*	GQ268327
Ageratum enation virus	India	*Amaranthus cruentus L.*	EU867513
Ageratum enation virus	India	*Cleome gynandra L.*	FJ177031
Ageratum enation virus	India	*Solanum lycopersicum*	KC795968
Ageratum enation virus	India	*Solanum lycopersicum*	KC818421
Ageratum enation virus	India	*Papaver somniferum*	HM149260
Ageratum enation virus	India	*Papaver somniferum*	JQ911765
Ageratum enation virus	Pakistan	*Ageratum conyzoides*	AM698011
Ageratum enation virus	India	*Papaya*	KP725057
Ageratum enation virus	India	*Daucus carota*	JF728865
Ageratum enation virus	India	*Daucus carota*	JF728867
Ageratum enation virus	India	*Ageratum houstonianum*	KJ488991
Ageratum enation virus	India	*Ageratum sp*	JQ911767
Ageratum enation virus	India	*Amaranthus hypochondriacus*	JF682242
Ageratum enation virus	India	*Tagetes papula*	KC589699
Ageratum enation virus	India	*Ageratum conyzoides*	JF728864
Ageratum enation virus	India	*Ageratum conyzoides*	JF728860
Ageratum enation virus	India	*Ageratum conyzoides*	JF728862
Ageratum enation virus	India	*Ageratum conyzoides*	JF728861
Ageratum enation virus	India	*Ageratum conyzoides*	JF728863
Ageratum enation virus	India	*Ageratum conyzoides*	JF728866
Ageratum enation virus	Pakistan	*Mullberry*	LT716985
Ageratum enation virus	India	*Glycine max*	HE861940
Ageratum enation virus	India	Not specified	FN794201

Ageratum enation virus	India	Not specified	FN794201
Ageratum enation virus	India	Not specified	FN543099
Ageratum enation virus	India	*Ageratum sp*	FN794198
Ageratum enation virus	India	*Solanum lycopersicum*	JX436472
Ageratum enation virus	India	*Fenugreek*	JX436473
Ageratum enation virus	India	*Calendula officinalis*	KM262822
Ageratum enation virus	India	*Calendula officinalis*	KM262823
Ageratum enation virus	Bangladesh	*Solanum lycopersicum*	KM383735
Ageratum leaf curl Cameroon virus	Cameroon	*Ageratum conyzoides*	FR873230
Ageratum leaf curl Cameroon virus	Cameroon	*Ageratum conyzoides*	FR873228
Ageratum leaf curl Cameroon virus	Cameroon	*Ageratum conyzoides*	FR873229
Ageratum leaf curl Cameroon virus	Cameroon	*Ageratum conyzoides*	FR717144
Ageratum yellow vein China virus	Philippines	*Synedrella nodiflora*	KC577539
Ageratum yellow vein China virus	Philippines	*Synedrella nodiflora*	KF785751
Ageratum yellow vein China virus	China	*Amaranthus blitum*	KU933257
Ageratum yellow vein China virus	China	*Ageratum conyzoides*	AJ495813
Ageratum yellow vein China virus	China	*Stachytarpheta*	AJ564744
Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	KU975392
Ageratum yellow vein China virus	China	*Amaranthus blitum*	KU601622
Ageratum yellow vein China virus	China	*Sonchus arvensis*	KX759646
Ageratum yellow vein China virus	Vietnam	*Ageratum conyzoides*	KC878475
Ageratum yellow vein China virus	China	*Synedrella nodiflora (L.)*	KF999980
Ageratum yellow vein China virus	China	*Ageratum conyzoides L*	KF999981
Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	KU975393
Ageratum yellow vein China virus	China	*Sonchus arvensis*	KX759647

Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	KU954387
Ageratum yellow vein China virus	China	*Oxalis corniculata*	JX972141
Ageratum yellow vein China virus	China	*Emilia sonchifolia*	KJ016239
Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	KU954388
Ageratum yellow vein China virus	Vietnam	*Zinnia violacea*	JX911332
Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	KU954383
Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	KU954389
Ageratum yellow vein China virus	China	*Ageratum conyzoides*	AJ849916
Ageratum yellow vein China virus	China	*Lycopersicon esculentum*	AJ558120
Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	KU954380
Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	KU954384
Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	KU954390
Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	KU954377
Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	KU954382
Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	KU954385
Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	KU954386
Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	KU954378
Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	KU954379
Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	HG003652
Ageratum yellow vein China virus	China	*Solanum lycorpesicum*	KU954381
Ageratum yellow vein Hualian virus	Taiwan	*Solanum lycorpesicum*	DQ866124
Ageratum yellow vein Hualian virus	Taiwan	*Ageratum*	DQ866132
Ageratum yellow vein Hualian virus	Taiwan	*Ageratum*	DQ866133
Ageratum yellow vein virus	Sri Lanka	Not specified	AF314144
Allamanda leaf curl virus	China	*Allamanda cathartica Linn.*	EF602306

Allamanda leaf mottle distortion virus	India	*Allamanda cathartica*	KC202818
Alternanthera yellow vein virus	India	*Picrorhiza kurrooa*	KT717678
Alternanthera yellow vein virus	India	*Rumex nepalensis*	LN795903
Alternanthera yellow vein virus	India	*Alternanthera sessilis*	LC316182
Alternanthera yellow vein virus	India	*Alternanthera sessilis*	LC316183
Alternanthera yellow vein virus	Pakistan	*Eclipta prostrata*	KX906695
Alternanthera yellow vein virus	Pakistan	*Eclipta prostrata*	KX906696
Alternanthera yellow vein virus	Pakistan	*Eclipta prostrata*	KX906694
Alternanthera yellow vein virus	Pakistan	*Eclipta prostrata*	KX906697
Alternanthera yellow vein virus	China	*Alternanthera philoxeroide*	AM050736
Alternanthera yellow vein virus	China	*Eclipta prostrata*	EF544601
Alternanthera yellow vein virus	China	*Eclipta prostrata*	EF544602
Alternanthera yellow vein virus	China	*Eclipta prostrata*	FJ015062
Alternanthera yellow vein virus	China	*Eclipta prostrata*	KX885031
Alternanthera yellow vein virus	China	*Alternanthera philoxeroides*	FJ712190
Alternanthera yellow vein virus	China	*Eclipta prostrata*	EU286797
Alternanthera yellow vein virus	Pakistan	*Sonchus arvensis*	FN432361
Alternanthera yellow vein virus	Vietnam	*Eclipta prostrata*	DQ641704
Alternanthera yellow vein virus	China	*Eclipta prostrata*	DQ375456
Alternanthera yellow vein virus	China	*Eclipta prostrata*	EU286798
Alternanthera yellow vein virus	China	*Eclipta prostrata*	EF544603
Alternanthera yellow vein virus	China	*Eclipta prostrata*	EF544604
Alternanthera yellow vein virus	Vietnam	*Zinnia elegans*	DQ641703
Alternanthera yellow vein virus	China	*Ludwigia hyssopifolia*	AJ965540
Andrographis yellow vein leaf curl virus	India	*Andrographis paniculata*	KM359406

Asystasia mosaic Madagascar virus	Madagascar	*Asystasia gangetica*	KP663483
Asystasia mosaic Madagascar virus	Madagascar	*Asystasia gangetica*	KP663485
Bean chlorosis virus	*Venezuela*	*Phaseolus vulgaris*	*JN848770*
Bean dwarf mosaic virus	Not specified	Not specified	M88179
Bean golden mosaic virus	Brazil	*Macroptilium lathyroides*	JN419003
Bean golden mosaic virus	Brazil	*Macroptilium lathyroides*	JN419004
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939719
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939731
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939735
Bean golden mosaic virus	Brazil	*Macroptilium lathyroides*	JN419006
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939764
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939709
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939715
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939717
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939732
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939733
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939734
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939708
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939725
Bean golden mosaic virus	Brazil	*Phaseolus sp.*	JF694451
Bean golden mosaic virus	Brazil	*Phaseolus sp.*	JF694452
Bean golden mosaic virus	Brazil	*Phaseolus sp.*	JF694449
Bean golden mosaic virus	Brazil	*Phaseolus sp.*	JF694453
Bean golden mosaic virus	Brazil	*Phaseolus sp.*	JF694450
Bean golden mosaic virus	Brazil	*Phaseolus sp.*	JF694454

Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939714
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939712
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939707
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939756
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939763
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939765
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939759
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939761
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939754
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939760
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939762
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939755
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939758
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939757
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939716
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939746
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939738
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939752
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939744
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939749
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939737
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939739
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939748
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939741
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939743

Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939751
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939750
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939740
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939747
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939753
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939742
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939745
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939721
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939722
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939729
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939726
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939727
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939728
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939730
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939736
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939713
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939718
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939723
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939724
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939710
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939711
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939720
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939851
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939853
Bean golden mosaic virus	Brazil	*Glycine max*	FJ665283

Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939845
Bean golden mosaic virus	Brazil	*Phaseolus lunatus*	KJ939832
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939850
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939799
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939815
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939786
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939836
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939803
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939806
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939792
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939813
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939802
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939810
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939822
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939781
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939829
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939824
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939839
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939838
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939848
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939816
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939837
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939783
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939795
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939841

Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939793
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939801
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939805
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939809
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939812
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939840
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939842
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939843
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939823
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939782
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939849
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939852
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939798
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939811
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939818
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939847
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939784
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939846
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939821
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939830
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939835
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939833
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939785
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939819
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939827

Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939831
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939844
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939826
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939828
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939787
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939788
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939825
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939820
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939834
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939780
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939779
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939790
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939796
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939800
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939804
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939807
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939797
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939789
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939794
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939808
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939814
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939817
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	KJ939791
Bean golden mosaic virus	Brazil	*Phaseolus vulgaris*	M88686
Bean golden mosaic virus	Brazil	*Macroptilium lathyroides*	KJ939768

Bean golden mosaic virus	Brazil	*Macroptilium lathyroides*	KJ939773
Bean golden mosaic virus	Brazil	*Macroptilium lathyroides*	KJ939770
Bean golden mosaic virus	Brazil	*Macroptilium lathyroides*	KJ939772
Bean golden mosaic virus	Brazil	*Macroptilium lathyroides*	KJ939774
Bean golden mosaic virus	Brazil	*Macroptilium lathyroides*	KJ939767
Bean golden mosaic virus	Brazil	*Macroptilium lathyroides*	KJ939771
Bean golden mosaic virus	Brazil	*Macroptilium lathyroides*	KJ939775
Bean golden mosaic virus	Brazil	*Macroptilium lathyroides*	KJ939778
Bean golden mosaic virus	Brazil	*Macroptilium lathyroides*	KJ939769
Bean golden mosaic virus	Brazil	*Macroptilium lathyroides*	KJ939777
Bean golden mosaic virus	Brazil	*Macroptilium lathyroides*	KJ939766
Bean golden mosaic virus	Brazil	*Macroptilium lathyroides*	KJ939776
Bean golden yellow mosaic virus	Puerto Rico-Japan	*Bean golden*	D00200
Bean golden yellow mosaic virus	Puerto Rico	*Bean golden*	M10080
Bean yellow mosaic Mexico virus	Mexico	*Phaseolus vulgaris*	FJ944023
Bean_golden_yellow_mosaic_virus	USA	*Field Beans*	DQ119824
Bean_golden_yellow_mosaic_virus	Cuba	*Phaseolus vulgaris*	KU160634
Bean_golden_yellow_mosaic_virus	Cuba	*Phaseolus vulgaris*	KX185518
Bean_golden_yellow_mosaic_virus	Cuba	*Phaseolus vulgaris*	AJ544531
Bean_golden_yellow_mosaic_virus	Cuba	*Phaseolus vulgaris*	KX185517
Bean_golden_yellow_mosaic_virus	Puerto Rico	*Solanum lycorpesicum*	M10070
Bean_golden_yellow_mosaic_virus	Puerto Rico	*Solanum lycorpesicum*	AF173555
Bean_golden_yellow_mosaic_virus	Dominican Republic	Not specified	L01635
Bean_golden_yellow_mosaic_virus	Guatemala	Not specified	M91604
Bhendi yellow vein India virus	India	*Abelmoschus esculentus*	GU112008

Bhendi yellow vein India virus	India	*Abelmoschus esculentus*	GU112054
Bhendi yellow vein India virus	India	*Abelmoschus esculentus*	GU112011
Bhendi yellow vein India virus	India	*Abelmoschus esculentus*	GU112052
Bhendi yellow vein India virus	India	*Abelmoschus esculentus*	GU112053
Bhendi yellow vein India virus	India	*Abelmoschus esculentus*	GU112051
Bhendi yellow vein India virus	India	*Abelmoschus esculentus*	GU112009
Bhendi yellow vein mosaic virus	Pakistan	Not specified	AJ002453
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112007
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus L. Moench*	KC501919
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus L. Moench*	KC501921
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	JQ326263
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	FJ179372
Bhendi yellow vein mosaic virus	India	Not specified	AF241479
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus L. Moench*	KC501920
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	FJ179370
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus L. Moench*	KC501922
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112006
Bhendi yellow vein mosaic virus	Thailand	*Abelmoschus esculentus*	JX678966
Bhendi yellow vein mosaic virus	Thailand	*Abelmoschus esculentus*	JX678967
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	JQ326269
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	JQ326270
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112055
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112056
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112075
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	JQ359504

Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	JQ326264
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	JQ359505
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	KU500807
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112074
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112061
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112062
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112073
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112072
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	JQ326268
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112071
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112070
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112067
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112068
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112066
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	KJ462082
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	FN645923
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	KF471063
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	FR694925
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	JX181785
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	FJ179371
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	FJ179373
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus L.*	KC501923
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	KT390461
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	KT390321
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	KT390322

Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	KT390323
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	KT390324
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	KT390325
Bhendi yellow vein mosaic virus	India	*Bhendi*	KF471062
Bhendi yellow vein mosaic virus	India	*Bhendi*	KF471064
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	FN645917
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	KJ462081
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112017
Bhendi yellow vein mosaic virus	India	*Abelmoschus esculentus*	GU112016
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112049
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112050
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	KT390451
Bhendi yellow vein virus	India	*Abelmoschus manihot*	KT390453
Bhendi yellow vein virus	India	Not specified	EU482411
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	JQ326267
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112031
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112037
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112025
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112026
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112035
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112023
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112024
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112034
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112033
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112048

Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112032
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112036
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112013
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112044
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112042
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112043
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112038
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112039
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112040
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112041
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112046
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	JQ326266
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112045
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112047
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112015
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112028
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	JQ359503
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112022
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112029
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112020
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112021
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	JQ326265
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112030
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112027
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112018

Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112019
Bhendi yellow vein virus	India	Not specified	EU589392
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112012
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	GU112014
Bhendi yellow vein virus	India	*Abelmoschus esculentus*	FJ589571
Blainvillea yellow spot virus	Brazil	*Blainvillea rhomboidea*	KC706521
Blainvillea yellow spot virus	Brazil	*Blainvillea rhomboidea*	KC706518
Blainvillea yellow spot virus	Brazil	*Blainvillea rhomboidea*	KC706517
Blainvillea yellow spot virus	Brazil	*Blainvillea rhomboidea*	KC706520
Blainvillea yellow spot virus	Brazil	*Blainvillea rhomboidea*	EU710756
Blainvillea yellow spot virus	Brazil	*Blainvillea rhomboidea*	KC706516
Blainvillea yellow spot virus	Brazil	*Blainvillea rhomboidea*	KC706519
Blainvillea yellow spot virus	Brazil	*Physalis sp.*	KC706522
Blainvillea yellow spot virus	Brazil	*Blainvillea rhomboidea*	JX871393
Blainvillea yellow spot virus	Brazil	*Blainvillea rhomboidea*	JX871394
Blainvillea yellow spot virus	Brazil	*Blainvillea rhomboidea*	JF694468
Blainvillea yellow spot virus	Brazil	*Blainvillea rhomboidea*	JF694476
Blainvillea yellow spot virus	Brazil	*Blainvillea rhomboidea*	JX871392
Blainvillea yellow spot virus	Brazil	*Blainvillea rhomboidea*	JX871389
Blainvillea yellow spot virus	Brazil	*Blainvillea rhomboidea*	JX871390
Blainvillea yellow spot virus	Brazil	*Blainvillea rhomboidea*	JX871391
Blechum interveinal chlorosis virus	Mexico	*Blechum pyramidatum*	JX827487
Boerhavia yellow spot virus	Mexico	*Boerhavia coccinea*	EF121755
Cabbage leaf curl Jamaica virus	Jamaica	*Cabbage*	DQ178614
Cabbage leaf curl Jamaica virus	Jamaica	*Cauliflower*	DQ178608

Cabbage leaf curl Jamaica virus	Jamaica	*Cauliflower*	DQ178610
Cabbage leal curl virus	Jamaica	*Cabbage*	DQ178612
Capraria yellow spot Yucatan virus	Mexico	*Capraria biflora*	KC426927
Cassava mosaic Madagascar virus	Madagascar	*Manihot esculenta*	HE617299
Catharanthus yellow mosaic virus	Pakistan	*Catharanthus roseus*	HE580234
Catharanthus yellow mosaic virus	Pakistan	*Catharanthus roseus*	HE580235
Catharanthus yellow mosaic virus	Pakistan	*Carica papaya*	LK028573
Catharanthus yellow mosaic virus	Pakistan	*Duranta repens*	LK028570
Cathranthus yellow vein mosaic virus	Pakistan	*Carica papaya*	LN864815
Centrosema yellow spot virus	Brazil	*Centrosema brasilianum*	JN419002
Chayote yellow mosaic virus	Nigeria	*Sechium edule*	AJ223191
Chayote yellow mosaic virus	Cameroon	*Fluted pumpkin*	KT454823
Chayote yellow mosaic virus	Togo	*Bitter melon*	KT454820
Chayote yellow mosaic virus	Cameroon	*Urtica*	KT454824
Chayote yellow mosaic virus	Nigeria	Not specified	KT454827
Chayote yellow mosaic virus	Cameroon	*Ageratum*	KT454821
Chayote yellow mosaic virus	Cameroon	*Carica papaya*	KT454822
Chayote yellow mosaic virus	Benin	*Bitter melon*	KT454819
Chayote yellow mosaic virus	Nigeria	*Bitter melon*	KT454825
Chayote yellow mosaic virus	Nigeria	*Sida acuta*	KT454826
Chenopodium leaf curl virus	USA	*Chenopodium ambrosioides*	HM626515
Chenopodium leaf curl virus	USA	*Bemisia tabaci*	HM626516
Chilli leaf curl Kanpur virus	India	*Chili*	HM007106
Chilli Leaf curl Vellanad virus	India	*Chili*	HM007121
Chilli leaf curl virus	India	*Solanum lycopersicum*	KP195266

Chilli leaf curl virus	India	*Chilli*	HM007100
Chilli leaf curl virus	India	*Chilli*	JN663865
Chilli leaf curl virus	India	*Solanum lycopersicum*	KJ649706
Chilli leaf curl virus	Pakistan	*Solanum tuberosum*	FM179613
Chilli leaf curl virus	India	*Solanum lycopersicum*	HG932561
Chilli leaf curl virus	India	*Capsicum sp*	FM877858
Chilli leaf curl virus	India	*Duranta repens*	KT948070
Chino del tomate Amazonas virus	Brazil	*Lycopersicon esculentum*	HM357461
Chino del tomate virus	Mexico	*Solanum lycorpesicum*	AY751753
Chino del tomate virus	Mexico	*Soybean*	DQ347945
Chino del tomate virus	USA	*Solanum lycorpesicum*	AF101476
Chino del tomate virus	USA	*Solanum lycorpesicum*	AF226665
Chino del tomate virus	Mexico	*Solanum lycorpesicum*	DQ885456
Chino del tomate virus	USA	*Solanum lycorpesicum*	AF226664
Cleome golden mosaic virus	Brazil	Cleome	HQ396465
Cleome leaf crumple virus	Brazil	Cleome affinis	JN103433
Cleome leaf crumple virus	Brazil	Cleome affini	FN435999
Cleome leaf crumple virus	Brazil	Cleome sp.	MF072686
Cleome leaf crumple virus	Brazil	Cleome affinis	JN103438
Cleome leaf crumple virus	Brazil	Cleome affinis	JN103435
Cleome leaf crumple virus	Brazil	Cleome affinis	JN103429
Cleome leaf crumple virus	Brazil	Cleome affinis	HM195184
Cleome leaf crumple virus	Brazil	Cleome affinis	JN103428
Cleome leaf crumple virus	Brazil	Cleome affinis	JN103432
Cleome leaf crumple virus	Brazil	Cleome affinis	JN103427

Cleome leaf crumple virus	Brazil	Cleome affinis	JF694461
Cleome leaf crumple virus	Brazil	Cleome affinis	JN103434
Cleome leaf crumple virus	Brazil	Cleome affinis	JN103431
Cleome leaf crumple virus	Brazil	Cleome affinis	JN103436
Cleome leaf crumple virus	Brazil	Cleome affinis	JN103430
Cleome leaf crumple virus	Brazil	Cleome affinis	JN103437
Cleome leaf crumple virus	Brazil	Cleome affinis	JN103439
Clerodendron yellow mosaic virus	India	*Duranta erecta*	KR869857
Clerodendron yellow mosaic virus	India	*Bougainvillea peruviana*	KF704392
Clerodendron yellow mosaic virus	India	*Bougainvillea peruviana*	KF704391
Clerodendron yellow mosaic virus	India	*Clerodendrum*	EF408037
Clerodendron yellow mosaic virus	Pakistan	*Croton sp.*	HE863667
Clerodendrum golden mosaic China virus	China	*Clerodendrum cyrtophyllum Turcz.*	FJ011668
Clerodendrum golden mosaic China virus	China	*Clerodendrum cyrtophyllum Turcz.*	FN396962
Clerodendrum golden mosaic China virus	USA	*Salvia splendens*	JQ305797
Clerodendrum golden mosaic Jiangsu virus	China	*Clerodendrum cyrtophyllum Turcz.*	FN396966
Clerodendrum golden mosaic virus	Vietnam	*Glory bower*	DQ641692
Clerodendrum golden mosaic virus	China	*Clerodendrum*	HQ317134
Cnidoscolus mosaic leaf deformation virus	Brazil	*Cnidoscolus urens*	KT966771
Coccinia mosaic Tamil Nadu virus	India	*Coccinia grandis*	KM244719
Common bean mottle virus	Cuba	*Phaseolus vulgaris*	KX011473
Common bean severe mosaic virus	Cuba	*Phaseolus vulgaris*	KX011476
Common bean severe mosaic virus	Cuba	*Phaseolus vulgaris*	KX011475
Common bean severe mosaic virus	Cuba	*Phaseolus vulgaris*	NC_031961
Common bean severe mosaic virus	Cuba	*Phaseolus vulgaris*	KX011477

Corchorus golden mosaic virus	Bangladesh:Mymensingh	*Corchorus capsularis*	AB849288
Corchorus golden mosaic virus	Vietnam: Hanoi	*Jute mallow*	DQ641688
Corchorus golden mosaic virus	India	*Boehmeria nivea*	KF962542
Corchorus golden mosaic virus	India: Bahraich	*Corchorus capsularis*	GQ183863
Corchorus golden mosaic virus	India: Bahraich	*Corchorus capsularis*	FJ463902
Corchorus golden mosaic virus	Bangladesh:Faridpur	*Corchorus capsularis*	AB971842
Corchorus golden mosaic virus	India	*Corchorus capsularis*	FJ790326
Corchorus golden mosaic virus	India: Barrackpore	*Corchorus capsularis*	EU636712
Corchorus golden mosaic virus	Bangladesh:Sherpur	*Corchorus capsularis*	AB971862
Corchorus golden mosaic virus	Bangladesh: Rangpur	*Corchorus capsularis*	AB849290
Corchorus golden mosaic virus	Bangladesh:Manikganj	*Corchorus capsularis*	AB971846
Corchorus golden mosaic virus	Bangladesh:Shariatpur	*Corchorus capsularis*	AB971844
Corchorus golden mosaic virus	Bangladesh:Jamalpur	*Corchorus capsularis*	AB971860
Corchorus golden mosaic virus	Bangladesh:Bogra	*Corchorus capsularis*	AB971854
Corchorus golden mosaic virus	Bangladesh:Kishoreganj	*Corchorus capsularis*	AB971848
Corchorus golden mosaic virus	Bangladesh:Kurigram	*Corchorus capsularis*	AB971850
Corchorus golden mosaic virus	Bangladesh:Gaibangha	*Corchorus capsularis*	AB971852
Corchorus golden mosaic virus	Bangladesh:Dinajpur	*Corchorus capsularis*	AB849292
Corchorus golden mosaic virus	Bangladesh:Sirajganj	*Corchorus capsularis*	AB971856
Corchorus yellow spot virus	Mexico	*Corchorus siliquosus*	DQ875868
Corchorus yellow vein mosaic virus	India	*Datura sp.*	KX513862
Corchorus yellow vein mosaic virus	India	*Corchorus olitorius*	KC196077
Corchorus yellow vein mosaic virus	India	*Corchorus olitorius*	KC223600
Corchorus yellow vein Vietnam virus	China	*Corchorus olitorius Linn*	KU245931
Corchorus yellow vein Vietnam virus	China: Fuzhou	*Corchorus olitorius L.*	KU245930

Corchorus yellow vein Vietnam virus	Vietnam	*Corchorus capsularis*	AY727903
Corchorus_yellow_vein_virus	China: Fuzhou	*Corchorus olitorius*	KX101212
Cotton chlorotic spot virus	Brazil	Gossypium hirsutum	KF358470
Cotton leaf crumple virus	USA	*Cotton*	AY083351
Cotton leaf crumple virus	USA	*Cotton*	AY742220
Cotton leaf crumple virus	USA	*Cotton*	AY083350
Cotton leaf crumple virus	Mexico	*Cotton*	AF480940
Cotton leaf curl Alabad virus	Pakistan	*Abelmoschus esculentus*	AJ002452
Cotton leaf curl Alabad virus	Pakistan	*Abelmoschus esculentus*	AJ002455
Cotton leaf curl Alabad virus	Pakistan	*Gossypium lobatum*	FJ210467
Cotton leaf curl Alabad virus	Pakistan	*Gossypium punctatum*	EU384575
Cotton leaf curl Alabad virus	Pakistan	*Gossypium hirsutum*	KX656793
Cotton leaf curl Alabad virus	Pakistan	*Gossypium hirsutum*	KX656791
Cotton leaf curl Alabad virus	Pakistan	*Gossypium hirsutum*	KX656792
Cotton leaf curl Alabad virus	Pakistan	*Gossypium hirsutum*	KX656789
Cotton leaf curl Alabad virus	Pakistan	*Gossypium hirsutum*	KX656790
Cotton leaf curl Alabad virus	Pakistan	*Gossypium hirsutum*	KX656794
Cotton leaf curl Bangalore virus	India	*Malvastrum coromandelianum*	LC316185
Cotton leaf curl Bangalore virus	India	Not specified	AY705380
Cotton leaf curl Bangalore virus	India	*Abelmoschus esculentus*	GU112003
Cotton leaf curl Gezira virus	Egypt	*Althea rosea*	AF014881
Cotton leaf curl Gezira virus	Oman	*Solanum lycopersicum*	HG969202
Cotton leaf curl Gezira virus	Oman	*Solanum lycopersicum*	HG969201
Cotton leaf curl Gezira virus	Oman	*Solanum lycopersicum*	HG969199
Cotton leaf curl Gezira virus	Oman	*Solanum lycopersicum*	HG969203

Cotton leaf curl Gezira virus	Saudi Arabia	*Abelmoschus esculentus*	HG530540
Cotton leaf curl Gezira virus	Nigeria	Not specified	KT454831
Cotton leaf curl Gezira virus	Sudan	*Abelmoschus esculentus*	FJ868828
Cotton leaf curl Gezira virus	Sudan	*Abelmoschus esculentus*	AY036006
Cotton leaf curl Gezira virus	Sudan	*Abelmoschus esculentus*	AY036008
Cotton leaf curl Gezira virus	Sudan	*Abelmoschus esculentus*	AY036007
Cotton leaf curl Gezira virus	Sudan	*Gossypium sp.*	AF260241
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554541
Cotton leaf curl Gezira virus	Nigeria	*Abelmoschus esculentus*	EU432373
Cotton leaf curl Gezira virus	Nigeria	*Abelmoschus esculentus*	FJ469626
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554526
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554533
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554534
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554535
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554536
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554537
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554538
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554539
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554528
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554521
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554523
Cotton leaf curl Gezira virus	Nigeria	*Abelmoschus esculentus*	EU432374
Cotton leaf curl Gezira virus	Nigeria	Not specified	FJ469627
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554522
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554540

Cotton leaf curl Gezira virus	Cote d'Ivoire	*Abelmoschus esculentus*	KX100570
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554519
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554520
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554527
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554524
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554525
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554529
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554530
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554531
Cotton leaf curl Gezira virus	Burkina Faso	*Abelmoschus esculentus*	FN554532
Cotton leaf curl Gezira virus	Israel	Unidentified plant	KT099132
Cotton leaf curl Gezira virus	United Arab Emirates	*Abelmoschus esculentus*	KJ939446
Cotton leaf curl Gezira virus	Cameroon	*Abelmoschus esculentus*	FM210276
Cotton leaf curl Gezira virus	Cameroon	*Abelmoschus esculentus*	HE793429
Cotton leaf curl Gezira virus	Pakistan	*Gossypium hirsutum*	FR751142
Cotton leaf curl Gezira virus	Pakistan	*Gossypium hirsutum*	FR751145
Cotton leaf curl Gezira virus	Pakistan	*Gossypium hirsutum*	FR751143
Cotton leaf curl Gezira virus	Pakistan	*Gossypium hirsutum*	FR751144
Cotton leaf curl Gezira virus	Pakistan	*Gossypium hirsutum*	FR751146
Cotton leaf curl Gezira virus	Egypt	*Althea rosea*	AF155064
Cotton leaf curl Gezira virus	Egypt	*Abelmoschus esculentus*	AY036010
Cotton leaf curl Gezira virus	Jordan	*Hollyhock*	GU945265
Cotton leaf curl Kokhran virus	India	Not specified	AH013913
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	KR815998
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	KR816000

Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	KR815999
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	KY420148
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	LN908968
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	KR816001
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	LN886550
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	LN886551
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	KY420146
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	KY420145
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	KY420147
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	KY420154
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	KY420151
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	KR816002
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	LN908967
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	KY420152
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	KY420153
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	KY420155
Cotton leaf curl Kokhran virus	India	*Cyamopsis tetragonoloba*	GU385879
Cotton leaf curl Kokhran virus	India	Not specified	AY456683
Cotton leaf curl Kokhran virus	India	Not specified	HQ257374
Cotton leaf curl Kokhran virus	Pakistan	*Jasminum sambac*	KY797661
Cotton leaf curl Kokhran virus	Pakistan	Not specified	AJ002448
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium stocksii*	HM468427
Cotton leaf curl Kokhran virus	Pakistan	Not specified	AJ002449
Cotton leaf curl Kokhran virus	Pakistan	*Jasminum sambac*	KY797663
Cotton leaf curl Kokhran virus	Pakistan	*Gossypium hirsutum*	AJ496286

Cotton leaf curl Kokhran virus	Pakistan	*Jasminum sambac*	KY797662
Cotton yellow mosaic virus	Benin	*Gossypium raimondii*	KU683747
Cotton yellow mosaic virus	Benin	*Gossypium raimondii*	KT454834
Cotton yellow mosaic virus	Benin	*Gossypium raimondii*	KU683748
Cowpea golden mosaic virus	Nigeria	*Nsukka*	AF029217
Cowpea golden mosaic virus	India	*Vigna unguiculata (cowpea)*	AY618902
Crassocephalum yellow vein virus	China	*Crassocephalum crepidioides*	EF165536
Crassocephalum yellow vein virus	China	*Crassocephalum crepidioides*	FN401520
Croton yellow vein mosaic virus	India	*Jatropha gossypifolia*	EU727086
Croton yellow vein mosaic virus	India	*Sidastrum micranthum*	KY612431
Croton yellow vein mosaic virus	India	*Croton bonplandianus*	JN831446
Croton yellow vein mosaic virus	India	*Croton bonplandianus*	AJ507777
Croton yellow vein mosaic virus	Pakistan	*Croton bonplandianus*	KX671964
Croton yellow vein mosaic virus	India	*Croton bonplandianus*	JN817516
Croton yellow vein mosaic virus	India	*Brassica rapa* subsp. *rapa*	KF888655
Croton yellow vein mosaic virus	India	*Crambe abyssinica*	KJ747958
Croton yellow vein mosaic virus	Pakistan	*Croton sparsiflorus*	LN871569
Croton yellow vein mosaic virus	India	*Acalypha sp.*	FN645902
Croton yellow vein mosaic virus	Pakistan	*Croton sparsiflorus*	LN886647
Croton yellow vein mosaic virus	India	*Cyamopsis tetragonoloba*	FN645915
Croton yellow vein mosaic virus	Pakistan	Not specified	HG937524
Croton yellow vein mosaic virus	Pakistan	*Solanum lycopersicum*	LN878119
Croton yellow vein mosaic virus	Pakistan	*Solanum lycopersicum*	LN878120
Croton yellow vein mosaic virus	Pakistan	*Solanum lycopersicum*	LN886525
Croton yellow vein mosaic virus	India	*Capsicum sp.*	JN663850

Croton yellow vein mosaic virus	India	*Acalypha sp.*	FN645898
Croton yellow vein mosaic virus	India	*Brassica rapa*	JX270684
Croton yellow vein mosaic virus	India	*Acalypha sp.*	FN645901
Croton yellow vein mosaic virus	India	*Acalypha sp.*	FN645926
Croton yellow vein mosaic virus	Pakistan	*Alcea rosea*	FN678906
Cucurbit leaf curl virus	USA	*Cucurbit*	AF224760
Dalechampia_chlorotic_mosaic_virus	Venezuela	Dalechampia sp.	JN848775
Dalechampia_chlorotic_mosaic_virus	Venezuela	*Boerhavia diffusa*	JN848777
Datura leaf distortion virus	Venezuela	*Datura stramonium*	JN848773
Deinbollia mosaic virus	Tanzania	*Deinbollia borbonica*	KT799138
Deinbollia mosaic virus	Tanzania	*Deinbollia borbonica*	KT878826
Deinbollia mosaic virus	Kenya	*Deinbollia borbonica*	KT878831
Deinbollia mosaic virus	Tanzania	*Deinbollia borbonica*	KT878824
Deinbollia mosaic virus	Tanzania	*Deinbollia borbonica*	KT878829
Desmodium leaf distortion virus	Mexico	*Desmodium glabrum*	DQ875870
Desmodium mottle virus	Uganda	*Desmodium sp.*	KY294724
Desmodium mottle virus	Uganda	*Desmodium sp.*	KY294725
Dicliptera yellow mottle virus	USA	Not specified	AF139168
Dicliptera yellow mottle virus	Cuba	*Dicliptera vahliana Nees*	AJ549960
Duranta leaf curl virus	Pakistan	*Duranta repens*	KT948069
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888083
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888058
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888061
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887962
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887957

East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887963
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887973
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887960
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887947
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887946
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887948
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909127
East African cassava mosaic Kenya virus	Mayotte	*Manihot esculenta*	JF909197
East African cassava mosaic Kenya virus	Mayotte	*Manihot esculenta*	JF909186
East African cassava mosaic Kenya virus	Mayotte	*Manihot esculenta*	JF909172
East African cassava mosaic Kenya virus	Mayotte	*Manihot esculenta*	JF909187
East African cassava mosaic Kenya virus	Mayotte	*Manihot esculenta*	JF909199
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888066
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888076
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888069
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888073
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888074
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888068
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	HE984147
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887581
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888079
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888087
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888081
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888071
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888072

East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888084
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888085
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888055
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888038
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888050
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888051
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888053
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888047
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888048
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887953
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887950
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887951
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887829
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887831
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887903
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887939
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887830
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ887949
East African cassava mosaic Kenya virus	Madagascar	*Manihot esculenta*	KJ888035
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909078
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909079
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909080
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909126
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909088
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909124

East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909122
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909123
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909089
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909125
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909112
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909113
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909100
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909114
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909095
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909116
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909108
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909109
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909107
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909091
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909093
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909098
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909104
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909105
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909103
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909101
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909081
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909085
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909086
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909083
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909087

East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909129
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909130
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909137
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909134
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909136
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909138
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909132
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909128
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909135
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909148
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909102
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909146
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909147
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909140
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909141
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909142
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909143
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909144
East African cassava mosaic Kenya virus	Comoros	*Manihot esculenta*	JF909145
East African cassava mosaic Kenya virus	Kenya	*Manihot esculenta*	AJ717580
East African cassava mosaic Kenya virus	Kenya	*Manihot esculenta*	AJ717573
East African cassava mosaic Kenya virus	Kenya	*Manihot esculenta*	AJ717576
East African cassava mosaic Kenya virus	Kenya	*Manihot esculenta*	AJ717574
East African cassava mosaic Kenya virus	Kenya	*Manihot esculenta*	AJ717575
East African cassava mosaic Kenya virus	Kenya	*Manihot esculenta*	AJ717572

East African cassava mosaic Kenya virus	Kenya	*Manihot esculenta*	AJ717571
East African cassava mosaic Kenya virus	Kenya	*Manihot esculenta*	AJ717569
East African cassava mosaic Kenya virus	Kenya	*Manihot esculenta*	AJ717570
East African cassava mosaic Kenya virus	Kenya	*Manihot esculenta*	AJ717579
East African cassava mosaic Kenya virus	Kenya	*Manihot esculenta*	AJ717577
East African cassava mosaic Kenya virus	Kenya	*Manihot esculenta*	AJ717578
East African cassava mosaic Kenya virus	Kenya	*Manihot esculenta*	AJ717582
East African cassava mosaic Kenya virus	Kenya	*Manihot esculenta*	AJ717581
East African cassava mosaic Malawi virus	Malawi	*Nicotiana benthamiana*	JX658693
East African cassava mosaic Malawi virus	Malawi	*Manihot esculenta*	JX658685
East African cassava mosaic Malawi virus	Malawi	*Nicotiana benthamiana*	JX658688
East African cassava mosaic Malawi virus	Malawi	*Nicotiana benthamiana*	JX658686
East African cassava mosaic Malawi virus	Malawi	*Nicotiana benthamiana*	JX658694
East African cassava mosaic Malawi virus	Malawi	*Manihot esculenta*	KY885004
East African cassava mosaic Malawi virus	Malawi	*Manihot esculenta*	AJ006460
East African cassava mosaic Malawi virus	Malawi	*Manihot esculenta*	AJ006459
East African cassava mosaic Malawi virus	Malawi	*Manihot esculenta*	KY885005
East African cassava mosaic Malawi virus	Zambia	*Manihot esculenta*	KP890349
East African cassava mosaic Malawi virus	Zambia	*Manihot esculenta*	KP890350
East African cassava mosaic Malawi virus	Zambia	*Manihot esculenta*	KT869119
East African cassava mosaic Malawi virus	Zambia	*Manihot esculenta*	KT869120
East African cassava mosaic Malawi virus	Zambia	*Manihot esculenta*	KP890353
East African cassava mosaic Malawi virus	Zambia	*Manihot esculenta*	KP890354
East African cassava mosaic Malawi virus	Zambia	*Manihot esculenta*	KT869121
East African cassava mosaic Malawi virus	Zambia	*Manihot esculenta*	KT869122

East African cassava mosaic Malawi virus	Zambia	*Manihot esculenta*	KP890351
East African cassava mosaic Malawi virus	Zambia	*Manihot esculenta*	KP890352
East African cassava mosaic Malawi virus	Malawi	*Manihot esculenta*	KY885003
East African cassava mosaic virus	Malawi	Not specified	JX473582
East African cassava mosaic virus	Tanzania	*Manihot esculenta*	AY795983
East African cassava mosaic virus	Malawi	*Manihot esculenta*	JX658692
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053439
East African cassava mosaic virus	Kenya	*Monihot esculenta*	JN053457
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053450
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053448
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053441
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053455
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053451
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053454
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053445
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053449
East African cassava mosaic virus	Kenya	*Monihot esculenta*	JN053459
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053437
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053453
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053435
East African cassava mosaic virus	Kenya	*Monihot esculenta*	JN053456
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053452
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053436
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053443
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053434

East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053442
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053446
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053438
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053444
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053433
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053432
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053440
East African cassava mosaic virus	Kenya	*Jatropha curcas*	JN053447
East African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979773
East African cassava mosaic virus	Uganda	Not specified	AM502330
East African cassava mosaic virus	Uganda	Not specified	AM502329
East African cassava mosaic virus	Uganda	*Manihot glaziovii*	AM502335
East African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979774
East African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979775
East African cassava mosaic virus	Uganda	*Manihot esculenta*	Z83257
East African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979770
East African cassava mosaic virus	Kenya	*Manihot esculenta*	JN053458
East African cassava mosaic virus	Kenya	*Manihot esculenta*	AJ717518
East African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979769
East African cassava mosaic virus	Uganda	*Manihot esculenta*	HE979772
East African cassava mosaic virus	Kenya	*Manihot esculenta*	AJ717520
East African cassava mosaic virus	Uganda	*Manihot esculenta*	AJ618958
East African cassava mosaic virus	Kenya	*Manihot esculenta*	HG530115
East African cassava mosaic virus	Kenya	*Manihot esculenta*	HG530112
East African cassava mosaic virus	Kenya	*Manihot esculenta*	HG530113

East African cassava mosaic virus	Kenya	*Manihot esculenta*	AJ717535
East African cassava mosaic virus	Kenya	*Manihot esculenta*	AJ717534
East African cassava mosaic virus	Kenya	*Manihot esculenta*	AJ717533
East African cassava mosaic virus	Uganda	Not specified	AM502331
East African cassava mosaic virus	Uganda	*Monihot glaziovii*	AM502336
East African cassava mosaic virus	Kenya	*Manihot esculenta*	AJ717522
East African cassava mosaic virus	Tanzania	Not specified	AY795988
East African cassava mosaic virus	Angola	Monihot esculenta	JN941177
East African cassava mosaic virus	Kenya	*Manihot esculenta*	AJ717519
East African cassava mosaic virus	Kenya	*Manihot esculenta*	AJ717532
East African cassava mosaic virus	Kenya	*Manihot esculenta*	AJ717530
East African cassava mosaic virus	Uganda	Not specified	AM502326
East African cassava mosaic virus	Equatorial Guinea	*Manihot esculenta*	KT780440
East African cassava mosaic virus	Uganda	Not specified	AJ618956
East African cassava mosaic virus	Uganda	Not specified	AM502327
East African cassava mosaic virus	Uganda	*Monihot glaziovii*	AM502334
East African cassava mosaic virus	Central African Republic	Not specified	HE814063
East African cassava mosaic virus	Republic of the Congo	*Manihot esculenta*	JX910240
East African cassava mosaic virus	Burkina Faso	*Manihot esculenta*	FM877474
East African cassava mosaic virus	Chad	Not specified	HE814064
East African cassava mosaic virus	Uganda	Not specified	AM502328
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717516
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717517
East African cassava mosaic virus	Uganda	*Monihot esculenta*	AJ618959
East African cassava mosaic virus	Uganda	Not specified	AM502337

East African cassava mosaic virus	Kenya	*Monihot esculenta*	HG530114
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717521
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717529
East African cassava mosaic virus	Kenya	*Monihot esculenta*	FN668377
East African cassava mosaic virus	Democratic Republic of the Congo	*Centrosema pubescens*	FN435281
East African cassava mosaic virus	Uganda	Not specified	AF126804
East African cassava mosaic virus	Uganda	*Monihot glaziovii*	AM502333
East African cassava mosaic virus	Democratic Republic of the Congo	*Pueraria javanica*	FN435279
East African cassava mosaic virus	Uganda	Not specified	AF126806
East African cassava mosaic virus	Democratic Republic of the Congo	*Centrosema pubescens*	FN435280
East African cassava mosaic virus	Uganda	Not specified	AM502332
East African cassava mosaic virus	Uganda	*Monihot esculenta*	HE979771
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717526
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717523
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717525
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717524
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717527
East African cassava mosaic virus	Democratic Republic of the Congo	*Pueraria javanica*	FN435278
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717528
East African cassava mosaic virus	Uganda	Not specified	AJ618957
East African cassava mosaic virus	Kenya	*Monihot esculenta*	HG530116
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717531
East African cassava mosaic virus	Tanzania	*Monihot esculenta*	AY795987
East African cassava mosaic virus	Tanzania	*Monihot esculenta*	Z83256
East African cassava mosaic virus	Madagascar	*Monihot esculenta*	KJ887964

East African cassava mosaic virus	Seychelles	*Monihot esculenta*	JF909156
East African cassava mosaic virus	Seychelles	*Monihot esculenta*	JF909151
East African cassava mosaic virus	Seychelles	*Monihot esculenta*	JF909152
East African cassava mosaic virus	Seychelles	*Monihot esculenta*	JF909161
East African cassava mosaic virus	Seychelles	*Monihot esculenta*	JF909158
East African cassava mosaic virus	Seychelles	*Monihot esculenta*	JF909159
East African cassava mosaic virus	Seychelles	*Monihot esculenta*	JF909160
East African cassava mosaic virus	Seychelles	*Monihot esculenta*	JF909154
East African cassava mosaic virus	Seychelles	*Monihot esculenta*	JF909155
East African cassava mosaic virus	Seychelles	*Monihot esculenta*	JF909153
East African cassava mosaic virus	Seychelles	*Monihot esculenta*	JF909157
East African cassava mosaic virus	Seychelles	*Monihot esculenta*	JF909162
East African cassava mosaic virus	Zambia	*Monihot esculenta*	KT869125
East African cassava mosaic virus	Zambia	*Monihot esculenta*	KT869126
East African cassava mosaic virus	Zambia	*Monihot esculenta*	KT869123
East African cassava mosaic virus	Zambia	*Monihot esculenta*	KT869124
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717558
East African cassava mosaic virus	Tanzania	*Monihot esculenta*	AY795986
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909193
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909185
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909073
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909074
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909063
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909174
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909075

East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909096
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909175
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909165
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909166
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909188
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909189
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909190
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909069
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909070
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909071
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909072
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909181
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909182
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909169
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909171
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909194
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909196
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909195
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909170
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909167
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909173
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909183
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909184
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909176
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909163

East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909164
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909178
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909180
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909068
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909076
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909077
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909198
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909067
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909065
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909064
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909066
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909177
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909179
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909192
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909168
East African cassava mosaic virus	Mayotte	*Monihot esculenta*	JF909191
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717556
East African cassava mosaic virus	Tanzania	*Manihot glaziovii*	MF067260
East African cassava mosaic virus	Tanzania	*Manihot glaziovii*	MF067262
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717555
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717543
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717542
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717541
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717537
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717536

East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717538
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717539
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717540
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717557
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ006458
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717546
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717544
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717545
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717553
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717554
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717552
East African cassava mosaic virus	Tanzania	Not specified	AY795985
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717551
East African cassava mosaic virus	Tanzania	*Manihot glaziovii*	MF067265
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717548
East African cassava mosaic virus	Tanzania	*Manihot glaziovii*	MF067264
East African cassava mosaic virus	Tanzania	*Manihot glaziovii*	MF067259
East African cassava mosaic virus	Tanzania	*Manihot glaziovii*	AJ717547
East African cassava mosaic virus	Tanzania	*Manihot glaziovii*	MF067253
East African cassava mosaic virus	Tanzania	*Manihot glaziovii*	MF067256
East African cassava mosaic virus	Tanzania	*Manihot glaziovii*	MF067257
East African cassava mosaic virus	Tanzania	*Manihot glaziovii*	MF067258
East African cassava mosaic virus	Tanzania	*Manihot glaziovii*	MF067263
East African cassava mosaic virus	Tanzania	*Manihot glaziovii*	MF067255
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717549

East African cassava mosaic virus	Tanzania	*Manihot glaziovii*	MF067254
East African cassava mosaic virus	Tanzania	*Manihot glaziovii*	MF067261
East African cassava mosaic virus	Kenya	*Monihot esculenta*	AJ717550
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909092
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909082
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909090
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909119
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909139
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909115
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909120
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909121
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909118
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909133
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909110
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909111
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909149
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909084
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909099
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909097
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909106
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909131
East African cassava mosaic virus	Comoros	*Monihot esculenta*	JF909150
East African cassava mosaic Zanzibar virus	Kenya	*Manihot esculenta*	AJ717567
East African cassava mosaic Zanzibar virus	Tanzania	*Cassava plant*	AF422174
East African cassava mosaic Zanzibar virus	Kenya	*Manihot esculenta*	AJ717568

East African cassava mosaic Zanzibar virus	Kenya	*Manihot esculenta*	AJ717566
East African cassava mosaic Zanzibar virus	Oman	*Manihot esculenta*	HE806427
East African cassava mosaic Zanzibar virus	Oman	*Manihot esculenta*	HE806428
East African cassava mosaic Zanzibar virus	Kenya	*Manihot esculenta*	AJ717562
East African cassava mosaic Zanzibar virus	Malawi	*Manihot esculenta*	JX658691
East African cassava mosaic Zanzibar virus	Kenya	*Manihot esculenta*	AJ717565
East African cassava mosaic Zanzibar virus	Kenya	*Manihot esculenta*	AJ717583
East African cassava mosaic Zanzibar virus	Kenya	*Manihot esculenta*	AJ717563
East African cassava mosaic Zanzibar virus	Kenya	*Manihot esculenta*	AJ717564
East African cassava mosaic Zanzibar virus	Kenya	*Manihot esculenta*	AJ717560
East African cassava mosaic Zanzibar virus	Kenya	*Manihot esculenta*	AJ717561
East African cassava mosaic Zanzibar virus	Kenya	*Manihot esculenta*	AJ516003
East African cassava mosaic Zanzibar virus	Kenya	*Manihot esculenta*	AJ717559
East Africancassava mosaic virus	Equatorial Guinea	*Manihot esculenta*	KT780439
Emilia yellow vein virus	China	*Emilia sonchifolia*	EU377539
Emilia yellow vein virus	China	*Crassocephalum crepidioides*	JQ247188
Emilia yellow vein virus	Vietnam	*Emilia sonchifolia*	KC878472
Emilia yellow vein virus	China	*Emilia sonchifolia*	KJ016240
Erectites yellow mosaic virus	Vietnam	*Fireweed*	DQ641698
Eupatorium yellow vein virus	Japan	*Eupatorium makinoi*	AJ438937
Eupatorium yellow vein virus	Japan	*Eupatorium makinoi*	AB300463
Eupatorium yellow vein virus	Japan	Not specified	AB433979
Eupatorium yellow vein virus	Japan	*Eupatorium makinoi*	AJ438936
Eupatorium yellow vein virus	Japan	*Eupatorium makinoi*	AB079766
Euphorbia leaf curl Guangxi virus	China	*Euphorbia pulcherrima*	AM411424

Euphorbia leaf curl virus	Pakistan	*Euphorbia pulcherrim*	FJ487911
Euphorbia leaf curl virus	Taiwan	*Passiflora edulis*	KC161185
Euphorbia leaf curl virus	Korea	*Passion fruit*	KT259282
Euphorbia leaf curl virus	China	*Euphorbia pulcherrima*	AJ558121
Euphorbia leaf curl virus	China	*Euphorbia pulcherrima*	KC852148
Euphorbia mosaic Venezuela virus	Venezuela	*Euphorbia heterophylla*	JN368145
Euphorbia mosaic virus	Mexico	*Euphorbia heterophylla L.*	DQ318937
Euphorbia mosaic virus	Mexico	*Capsicum annum*	DQ520942
Euphorbia mosaic virus	Puerto Rico	*Euphorbia sp.*	AF068642
Euphorbia mosaic virus	Cuba	*Glycine max*	KU165788
Euphorbia mosaic virus	Cuba	*Euphorbia heterophylla*	HQ896201
Euphorbia mosaic virus	USA	*Euphorbia heterophylla*	JQ963887
Euphorbia mosaic virus	USA	*Passiflora sp.*	KJ647290
Euphorbia mosaic virus	Cuba	*Nicotiana tabacum*	FJ807782
Euphorbia mosaic virus	Jamaica	*Euphorbia heterophylla*	FJ407052
Euphorbia mosaic virus	Jamaica	*Wissadula amplissima*	DQ395342
Euphorbia yellow leaf curl virus	Pakistan	*Hibiscus syriacu*	KP780424
Euphorbia yellow leaf curl virus	Pakistan	*Hibiscus syriacu*	KM978186
Euphorbia yellow mosaic virus	Brazil	*Leonurus sibiricus*	KX348224
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KX691395
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559538
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559475
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559506
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559505
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559519

Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559520
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559579
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559491
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559478
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559482
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559486
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559480
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559477
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559476
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559490
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559503
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559504
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559489
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559481
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559479
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559484
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559571
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559578
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559551
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559566
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559553
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559554
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559487
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559540
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559541

Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559485
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559508
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559516
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559518
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559474
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559514
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559512
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559577
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559513
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559515
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559473
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559509
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559510
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559522
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559511
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559528
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559521
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559532
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559507
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559562
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559483
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559560
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559542
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559536
Euphorbia yellow mosaic virus	Brazil	*Sida sp.*	KX348180

Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559559
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559561
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559565
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559575
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559534
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559524
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559557
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559531
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559564
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559568
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559569
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559555
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559556
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559547
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559544
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559545
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559546
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559543
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559548
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559549
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559550
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559567
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559574
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559572
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559573

Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559539
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559537
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559535
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559552
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559558
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559563
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559533
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559576
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559570
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559502
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559525
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559527
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559526
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559517
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559523
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559529
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559530
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559452
Euphorbia yellow mosaic virus	Brazil	*Euphorbia sp.*	FN435997
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559453
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559488
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559454
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559450
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559430
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559456

Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559472
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559458
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559455
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559469
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559457
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559464
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559462
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559460
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559470
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559459
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559461
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559467
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559471
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559463
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559466
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559465
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559468
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	FJ619507
Euphorbia yellow mosaic virus	Brazil	*Euphorbia sp.*	FN435995
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559451
Euphorbia yellow mosaic virus	Brazil	*Manihot esculenta*	KY905705
Euphorbia yellow mosaic virus	Brazil	*Sida santaremensis*	JX871379
Euphorbia yellow mosaic virus	Brazil	*Macroptilium atropurpureum*	JN419000
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559501
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559495

Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559492
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559499
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559493
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559496
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559498
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559500
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559494
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559497
Euphorbia yellow mosaic virus	Brazil	*Leonurus sibiricus*	KX348182
Euphorbia yellow mosaic virus	Brazil	*Euphorbia sp.*	KC706530
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	JF756675
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	JF756670
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	JF756669
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	JF756674
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	JF756673
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559448
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559443
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559447
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559446
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559439
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559440
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559431
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559434
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559444
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559445

Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559432
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559438
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559433
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559436
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559437
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559441
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559435
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559449
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	KY559442
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	JF756676
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	JF756672
Euphorbia yellow mosaic virus	Brazil	*Crotalaria juncea*	JX415191
Euphorbia yellow mosaic virus	Brazil	*Crotalaria sp. voucher*	JX415185
Euphorbia yellow mosaic virus	Brazil	*Crotalaria sp.voucher*	JX415184
Euphorbia yellow mosaic virus	Brazil	*Crotalaria sp.voucher*	JX415186
Euphorbia yellow mosaic virus	Brazil	*Solanum lycopersicum*	JX415192
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	JF756671
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla*	JX415200
Euphorbia yellow mosaic virus	Brazil	*Euphorbia heterophylla voucher*	JX415189
French bean leaf curl virus	India	*Phaseolus vulgaris*	JQ866297
Gossypium darwinii symptomless virus	Pakistan	*Gossypium darwinii*	EU365613
Gossypium darwinii symptomless virus	Not specified	*Gossypium darwinii*	EU365614
Gossypium darwinii symptomless virus	Not specified	*Gossypium darwinii*	EU365615
Hemidesmus yellow mosaic virus	India	*Hemidesmus indicus*	KC898543
Hemidesmus yellow mosaic virus	India	*Hemidesmus indicus*	KC898544

Hollyhock leaf curl virus	Pakistan	*Alcea rosea*	FR772082
Hollyhock leaf curl virus	Pakistan	*Malva parviflora L.*	LT716980
Hollyhock yellow vein mosaic virus	Pakistan	*Alcea. sp*	LK028571
Hollyhock yellow vein mosaic virus	Pakistan	Not specified	LM645009
Honeysuckle yellow vein mosaic virus	Japan	Not specified	AB236323
Honeysuckle yellow vein mosaic virus	United Kingdom	*Lonicera japonica*	AJ421523
Honeysuckle yellow vein mosaic virus	Japan	Not specified	AB178946
Honeysuckle yellow vein mosaic virus	Japan	Not specified	AB178947
Honeysuckle yellow vein mosaic virus	Japan	Not specified	AB178948
Honeysuckle yellow vein virus	Japan	Not specified	AB236321
Honeysuckle yellow vein virus	South Korea	*Lonicera japonica*	GQ477135
Honeysuckle yellow vein virus	United Kingdom	*Lonicera japonica var. aureo-reticulata*	AJ542540
Honeysuckle yellow vein virus	United Kingdom	*Lonicera japonica var. aureo-reticulata*	AJ543429
Honeysuckle yellow vein virus	New Zealand	*Lonicera japonica*	FJ817425
Honeysuckle yellow vein virus	Australia	*Lonicera japonica var. aureo-reticulata*	JX416174
Honeysuckle yellow vein virus	Japan	Not specified	AB236325
Honeysuckle yellow vein virus	South Korea	*Solanum lycopersicum*	HM164547
Honeysuckle yellow vein virus	South Korea	*Honeysuckle*	HQ189431
Honeysuckle yellow vein virus	South Korea	*Solanum lycopersicum*	FJ434943
Honeysuckle yellow vein virus	South Korea	*Solanum lycopersicum*	HM164545
Honeysuckle yellow vein virus	Japan	*Lonicera japonica*	AB287439
Honeysuckle yellow vein virus	Japan	Not specified	AB079689
Honeysuckle yellow vein virus	Japan	Not specified	AB182261
Honeysuckle yellow vein virus	Japan	*Lonicera japonica*	AB287440
Honeysuckle yellow vein virus	Japan	*Lonicera japonica*	AB287441

Honeysuckle yellow vein virus	Japan	Not specified	AB079765
Honeysuckle yellow vein virus	Japan	Not specified	AB178945
Horsegram yellow mosaic virus	Sri Lanka	*Phaseolus vulgaris*	GU323321
Horsegram yellow mosaic virus	India	*Phaseolus lunatus*	AM932429
Horsegram yellow mosaic virus	India	*Phaseolus vulgaris*	AM932425
Horsegram yellow mosaic virus	India	*Macrotyloma uniflorum*	AJ627904
Horsegram yellow mosaic virus	India	*Vigna unguiculata*	AM932427
Horsegram yellow mosaic virus	India	*Phaseolus vulgaris*	KC019306
Horsegram yellow mosaic virus	India	*French bean*	KP752088
Indian cassava mosaic virus	Not specified	Not specified	Z24758
Indian cassava mosaic virus	India	*Nicotiana benthamiana*	AJ314739
Indian cassava mosaic virus	India	Not specified	AY730035
Indian cassava mosaic virus	India	*Cassava cv. Sengutchi*	KU308385
Indian cassava mosaic virus	India	*Monihot esculenta*	AJ575819
Indian cassava mosaic virus	India	*Monihot esculenta*	KU550960
Jacquemontia mosaic Yucatan virus	Mexico	*Jacquemontia pentantha*	JQ821386
*Jacquemontia yellow vein virus_*	Venezuela	*Jacquemontia tamnifolia*	KY624376
*Jacquemontia yellow vein virus_*	Venezuela	*Jacquemontia tamnifolia*	KY617094
Jatropha leaf crumple India virus	India	*Jatropha curcas*	KM189818
Jatropha leaf crumple India virus	India	*Jatropha curcas*	KM189819
Jatropha leaf crumple virus	India	*Jatropha curcas*	KM023146
Jatropha mosaic Nigerian virus	Nigeria	*Jatropha curcas L.*	JX025360
Jatropha mosaic Nigerian virus	Nigeria	*Jatropha curcas L.*	JX025358
Jatropha mosaic Nigerian virus	Nigeria	*Jatropha curcas L.*	JX025359
Jatropha mosaic virus	Jamaica	*Jatropha gossypifoli*	KF723258

Jatropha mosaic virus	Jamaica	*Jatropha gossypifoli*	KF723260
Jatropha mosaic virus	Jamaica	*Jatropha gossypifoli*	KF723259
Jatropha mosaic virus	Dominican Republic	*Jatropha sp.*	KJ174331
Jatropha mosaic virus	Dominican Republic	*Jatropha sp.*	KJ174332
Jatropha mosaic virus	Dominican Republic	*Jatropha sp.*	KJ174333
Jatropha mosaic virus	USA	*Jatropha multifida*	KF998097
Jatropha mosaic virus	Dominican Republic	*Jatropha sp.*	KJ174330
Jatropha yellow mosaic virus	India	*Jatropha gossypiifolia*	FJ177030
Kudzu mosaic virus	China	*Kudzu*	FJ539014
Kudzu mosaic virus	Vietnam	*Kudzu*	DQ641690
Kudzu mosaic virus	Vietnam	*Soybean*	HQ162271
Leonurus mosaic virus	Brazil	*Leonurus sibiricus*	JX863082
Leonurus mosaic virus	Brazil	*Leonurus sibiricus*	JQ429791
Leonurus mosaic virus	Brazil	*Leonurus sibiricus*	JX863081
Leonurus mosaic virus	Paraguay	*Leonurus sibiricus L.*	KC683374
Lindernia anagallis yellow vein virus	China	*Lindernia anagallis*	KC172827
Lindernia anagallis yellow vein virus	China	*Lindernia anagallis*	AY795900
Lindernia anagallis yellow vein virus	Vietnam	*False pimpernel*	DQ641701
Lisianthus enation leaf curl virus	Taiwan	*Eustoma grandiflorum*	LC091538
Lisianthus enation leaf curl virus	Taiwan	*Eustoma grandiflorum*	LC091539
Loofa yellow mosaic virus	Vietnam	*Luffa acutungula*	AF509739
Ludwigia yellow vein Vietnam virus	Vietnam	*Primrose willow*	DQ641699
Ludwigia yellow vein Vietnam virus	China	*Ludwigia hyssopifolia*	AJ965539
Ludwigia yellow vein Vietnam virus	Vietnam	*Primrose willow*	DQ641708
Lycianthes yellow mosaic virus	China	*Lycianthes biflora*	KT582302

Macroptilium bright mosaic virus	Brazil	*Macroptilium lathyroides*	KX691399
Macroptilium bright mosaic virus	Brazil	*Macroptilium lathyroides*	KX691400
Macroptilium common mosaic virus	Brazil	*Macroptilium lathyroides*	KX691396
Macroptilium common mosaic virus	Brazil	*Macroptilium lathyroides*	KX691397
Macroptilium golden mosaic virus	Jamaica	*Wissadula amplissima*	EF645647
Macroptilium golden mosaic virus	Jamaica	*Wissadula amplissima*	EU158096
Macroptilium mosaic Puerto Rico virus	Puerto Rico	*Rhynchosia minima*	AY044133
Macroptilium mosaic Puerto Rico virus	Puerto Rico	Unidentified Plant	KT099141
Macroptilium mosaic Puerto Rico virus	Puerto Rico	*Bean*	AF449192
Macroptilium yellow mosaic Florida virus	USA	Not specified	AY044135
Macroptilium yellow mosaic virus	Cuba	Not specified	AJ344452
Macroptilium yellow mosaic virus	Jamaica	Macroptilium lathyroides	EF585290
Macroptilium yellow mosaic virus	Jamaica	Macroptilium lathyroides	EF582840
Macroptilium yellow mosaic virus	Jamaica	Macroptilium lathyroides	EF585288
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KX691398
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	JN419009
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	JN419005
Macroptilium yellow spot virus	Brazil	*Desmodium glabrum*	KT779564
Macroptilium yellow spot virus	Brazil	*Desmodium glabrum*	KT779561
Macroptilium yellow spot virus	Brazil	*Desmodium glabrum*	KT779565
Macroptilium yellow spot virus	Brazil	*Desmodium glabrum*	KT779562
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KC004107
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939890
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004122
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004123

Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	JN419022
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939871
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KJ939895
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	JN419007
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KJ939896
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004094
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KC004103
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004092
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004131
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004102
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004127
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004095
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004100
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004111
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004116
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004101
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004129
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KJ939897
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	JN419013
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939859
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939891
Macroptilium yellow spot virus	Brazil	*Canavalia sp.*	JN419019
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	JN419014
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939893
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KC004106

Macroptilium yellow spot virus	Brazil	*Calopogonium mucunoides*	JN419016
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	JN419020
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939873
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939886
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939862
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939884
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004093
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KC004109
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	JN419018
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939868
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KJ939857
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939888
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939889
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939855
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004117
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KC004132
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939882
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KC004108
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KC004104
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004120
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939878
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004124
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939861
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939875
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004118

Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939870
Macroptilium yellow spot virus	Brazil	*Calopogonium mucunoides*	JN419015
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004091
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004096
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939894
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939880
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KC004112
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KJ939856
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939866
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939864
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939865
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	JN419012
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004114
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004119
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939869
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939892
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939885
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KC004105
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939872
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004099
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939863
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939879
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939867
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939883
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004134

Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004097
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004098
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939854
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004113
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939881
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004130
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939887
Macroptilium yellow spot virus	Brazil	*Phaseolus lunatus*	KJ939860
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004115
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004121
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939877
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KC004110
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004125
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004128
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KC004126
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939858
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939874
Macroptilium yellow spot virus	Brazil	*Macroptilium lathyroides*	KC004133
Macroptilium yellow spot virus	Brazil	*Phaseolus vulgaris*	KJ939876
Macroptilium yellow vein virus	Brazil	*Macroptilium sp.*	JN419021
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939899
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939908
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939898
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939905
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939910

Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939912
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939914
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939913
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939907
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939903
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939904
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939902
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939909
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939911
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939906
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939915
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939900
Macroptilium yellow vein virus	Brazil	*Macroptilium lathyroides*	KJ939901
Malachra yellow vein mosaic virus	India	*Malachra capitata*	LC080677
Malvastrum bright yellow mosaic virus	USA	*Malvastrum sp.*	KU058855
Malvastrum bright yellow mosaic virus	USA	*Malvastrum sp.*	KU058856
Malvastrum bright yellow mosaic virus	USA	*Malvastrum sp.*	KU058854
Malvastrum bright yellow mosaic virus	USA	*Malvastrum sp.*	KU058852
Malvastrum bright yellow mosaic virus	USA	*Malvastrum sp.*	KU058853
Malvastrum bright yellow mosaic virus	USA	*Malvastrum sp.*	KU058851
Malvastrum leaf curl virus	China	*Malvastrum coromandelianum*	EF554783
Malvastrum leaf curl virus	China	*Malvastrum*	FJ712189
Malvastrum leaf curl virus	China	*Malvastrum coromandelianum*	AJ971263
Malvastrum leaf curl virus	China	*Not specified*	AM260699
Malvastrum yellow mosaic Helshire virus	Jamaica	*Malvastrum americanum*	FJ600483

Malvastrum yellow mosaic Jamaica virus	Jamaica	*Malvastrum americanum*	FJ601917
Malvastrum yellow mosaic Jamaica virus	Jamaica	*Malvastrum americanum*	FJ600482
Malvastrum yellow mosaic virus	China	*Malvastrum coromandelianum (L.)*	KF999982
Malvastrum yellow mosaic virus	China	Not specified	AM236755
Malvastrum yellow mosaic virus	China	Not specified	AM236756
Malvastrum yellow mosaic virus	China	*Malvastrum coromandelianum*	KJ016233
Malvastrum yellow mosaic virus	China	*Malvastrum coromandelianum*	KJ016237
Malvastrum yellow vein Cambodia virus	Cambodia	*Malvastrum coromandelianum*	KP188831
Malvastrum yellow vein Honghe virus	China	*Malvastrum coromandelianum*	FN552749
Malvastrum yellow vein Honghe virus	China	*Solanum lycopersicum*	KU601620
Malvastrum yellow vein virus	China	*Solanum lycopersicum*	KU975394
Malvastrum yellow vein virus	China	Not specified	JX679250
Malvastrum yellow vein virus	China	*Malva parviflora*	JX679249
Malvastrum yellow vein virus	China	*Malva parviflora*	JX679256
Malvastrum yellow vein virus	China	*Malvastrum coromandelianum*	AJ971501
Malvastrum yellow vein virus	China	*Malvastrum*	JN082234
Malvastrum yellow vein virus	China	*Malvastrum coromandelianum*	JN082238
Malvastrum yellow vein virus	China	*Malvastrum coromandelianum*	AJ786711
Malvastrum yellow vein virus	China	*Malvastrum coromandelianum*	KC189891
Malvastrum yellow vein virus	China	*Malvastrum coromandelianum*	KC189892
Malvastrum yellow vein virus	China	Not specified	AJ457824
Malvastrum yellow vein virus	China	*Ageratum conyzoides*	AJ744881
Malvastrum yellow vein virus	China	*Malvastrum coromandelianum*	JN082236
Malvastrum yellow vein virus	China	*Malvastrum coromandelianum*	N082235
Malvastrum yellow vein virus	China	*Malvastrum coromandelianum*	JN082239

Melochia yellow mosaic virus	Brazil	*Melochia sp.*	KT201153
Melon chlorotic leaf curl virus	Guatemala	*Unidentified Plant*	KT099118
Melon chlorotic leaf curl virus	Guatemala	*Unidentified Plant*	AF325497
Melon chlorotic leaf curl virus	Costa Rica	*Cucurbita sp.*	AY064391
Merremia mosaic Puerto Rico virus	Puerto Rico	*Merremia quinquefolia*	FJ944021
Merremia mosaic virus	Venezuela	Not specified	AY508991
Merremia mosaic virus	Puerto Rico	Not specified	DQ644558
Merremia mosaic virus	Puerto Rico	Not specified	DQ644557
Merremia mosaic virus	Puerto Rico	Not specified	AF068636
Mesta yellow vein mosaic Bahraich virus	India	*Hibiscus cannabinus*	EU360303
Mesta yellow vein mosaic Bahraich virus	India	*Hibiscus cannabinus*	FJ159267
Mesta yellow vein mosaic Bahraich virus	India	*Hibiscus cannabinus*	FJ159268
Mimosa yellow leaf curl virus	Vietnam	*Touch me not*	DQ641695
Mirabilis leaf curl virus	India	*Mirabilis jalapa*	LK054801
Mungbean yellow mosaic India virus	India	*Soybean*	AJ420331
Mungbean yellow mosaic India virus	Indonesia	*Yard long bean*	JN368432
Mungbean yellow mosaic India virus	Indonesia	*Yard long bean*	JN368437
Mungbean yellow mosaic India virus	Indonesia	*Soybean*	JN368439
Mungbean yellow mosaic India virus	Indonesia	*Yard long bean*	JN368433
Mungbean yellow mosaic India virus	Indonesia	*Yard long bean*	JN368436
Mungbean yellow mosaic India virus	Indonesia	*Yard long bean*	JN368434
Mungbean yellow mosaic India virus	Indonesia	*Yard long bean*	JN368435
Mungbean yellow mosaic India virus	Indonesia	*Soybean*	JN368438
Mungbean yellow mosaic India virus	India	Not specified	AY937195
Mungbean yellow mosaic India virus	Oman	*Phaseolus vulgaris*	KX452226

Mungbean yellow mosaic India virus	Oman	*Phaseolus vulgaris*	KX452228
Mungbean yellow mosaic India virus	Oman	*Phaseolus vulgaris*	KX452227
Mungbean yellow mosaic India virus	Bangladesh	Not specified	AF314145
Mungbean yellow mosaic India virus	India	*Mungbean*	KU950430
Mungbean yellow mosaic India virus	India	*Solanum lycopersicum*	MF683072
Mungbean yellow mosaic India virus	India	*Glycine max*	HF922628
Mungbean yellow mosaic India virus	India	*Mungbean*	KP313758
Mungbean yellow mosaic India virus	India	*French bean*	KP779633
Mungbean yellow mosaic India virus	India	*French bean*	KP779635
Mungbean yellow mosaic India virus	India	*Soybean*	AY049772
Mungbean yellow mosaic India virus	India	*Glycine max*	LC271794
Mungbean yellow mosaic India virus	India	*Cajanus cajan*	KX363947
Mungbean yellow mosaic India virus	India	*Soybean*	EU523045
Mungbean yellow mosaic India virus	India	*Soybean*	KC852204
Mungbean yellow mosaic India virus	India	*Glycine max*	KR052025
Mungbean yellow mosaic India virus	India	*Vegna mungo*	LC271790
Mungbean yellow mosaic India virus	India	*Vegna mungo*	JX110618
Mungbean yellow mosaic India virus	India	*Blackgram*	KC911719
Mungbean yellow mosaic India virus	India	*Blackgram*	KC911720
Mungbean yellow mosaic India virus	India	*Mungbean*	AF416742
Mungbean yellow mosaic India virus	India	*Phaseolus vulgaris*	FN794200
Mungbean yellow mosaic India virus	India	*Phaseolus vulgaris*	AJ416349
Mungbean yellow mosaic India virus	India	*French bean*	KP779630
Mungbean yellow mosaic India virus	India	*Glycine max*	LC271792
Mungbean yellow mosaic India virus	India	*Greengram*	AY271893

Mungbean yellow mosaic India virus	Pakistan	*Vigna mungo*	FM208844
Mungbean yellow mosaic India virus	Pakistan	*Vigna mungo*	FM208845
Mungbean yellow mosaic India virus	Pakistan	*Vigna radiata*	FM208843
Mungbean yellow mosaic India virus	Pakistan	*Vigna radiata*	FM208846
Mungbean yellow mosaic India virus	Pakistan	*Vigna radiata*	FM208842
Mungbean yellow mosaic India virus	Pakistan	*Mungbean*	AM950268
Mungbean yellow mosaic India virus	Pakistan	*Mungbean*	AY269992
Mungbean yellow mosaic India virus	Pakistan	*Mungbean*	FM955599
Mungbean yellow mosaic India virus	Pakistan	*Vigna radiata*	FM955600
Mungbean yellow mosaic India virus	Pakistan	*Glycine max*	FM208833
Mungbean yellow mosaic India virus	Pakistan	*Glycine max*	FM208834
Mungbean yellow mosaic India virus	Pakistan	*Vigna mungo*	FM208841
Mungbean yellow mosaic India virus	Pakistan	*Vigna radiata*	FM955598
Mungbean yellow mosaic India virus	Pakistan	*Vigna radiata*	FM208839
Mungbean yellow mosaic India virus	Pakistan	*Vigna radiata*	JN543395
Mungbean yellow mosaic India virus	Nepal	*Phaseolus lunatus*	JQ327845
Mungbean yellow mosaic India virus	Nepal	*Phaseolus lunatus*	JQ327846
Mungbean yellow mosaic India virus	Nepal	*Phaseolus lunatus*	JQ327847
Mungbean yellow mosaic India virus	Pakistan	*Glycine max*	KX697338
Mungbean yellow mosaic India virus	Pakistan	*Glycine max*	KX711619
Mungbean yellow mosaic India virus	Pakistan	*Vigna unguiculata*	FM208840
Mungbean yellow mosaic India virus	Pakistan	*Glycine max*	KX671567
Mungbean yellow mosaic India virus	Pakistan	*Glycine max*	KX711618
Mungbean yellow mosaic India virus	Pakistan	*Vigna unguiculata*	FR837935
Mungbean yellow mosaic India virus	Pakistan	*Vigna radiata*	FM208837

Mungbean yellow mosaic India virus	India	*Phaseolus vulgaris*	KC019303
Mungbean yellow mosaic India virus	India	*Phaseolus vulgaris*	KC019304
Mungbean yellow mosaic India virus	India	*Cowpea*	DQ389154
Mungbean yellow mosaic India virus	India	*Dolichos*	AY547317
Mungbean yellow mosaic India virus	India	*Cowpea*	AF481865
Mungbean yellow mosaic India virus	Pakistan	*Vigna radiata*	FM208836
Mungbean yellow mosaic India virus	Nepal	*Mungbean showing*	AY271895
Mungbean yellow mosaic India virus	Pakistan	*Vigna mungo*	FM208835
Mungbean yellow mosaic India virus	Pakistan	*Vigna radiata*	FM208838
Mungbean yellow mosaic India virus	Pakistan	*Cowpea*	AY269990
Mungbean yellow mosaic India virus	Pakistan	*Glycine max*	KX671566
Mungbean yellow mosaic India virus	Pakistan	*Glycine max*	KX671568
Mungbean yellow mosaic India virus	Pakistan	*Glycine max*	KX711620
Mungbean yellow mosaic India virus	Pakistan	*Glycine max*	KX671565
Mungbean yellow mosaic India virus	Pakistan	*Glycine max*	KX711621
Mungbean yellow mosaic India virus	Pakistan	*Glycine max*	AM992618
Mungbean yellow mosaic India virus	Pakistan	*Glycine max*	AF126406
Mungbean yellow mosaic India virus	Pakistan	Not specified	DQ400847
Mungbean yellow mosaic virus	India	*Vigna mungo*	JQ398669
Mungbean yellow mosaic virus	India	*Mungbean showing*	AY271896
Mungbean yellow mosaic virus	Pakistan	*Rhynchosia capitata*	FM242701
Mungbean yellow mosaic virus	Pakistan	*Soybean*	AY269991
Mungbean yellow mosaic virus	India	*Vigna aconitifolia*	DQ865201
Mungbean yellow mosaic virus	Thailand	*Mungbean*	AB017341
Mungbean yellow mosaic virus	Not specified	Not specified	D14703

Mungbean yellow mosaic virus	Cambodia	*Mungbean*	AY271892
Mungbean yellow mosaic virus	Vietnam	*Mungbean*	JX244176
Mungbean yellow mosaic virus	Vietnam	*Mungbean*	JX244174
Mungbean yellow mosaic virus	Vietnam	*Mungbean*	JX244175
Mungbean yellow mosaic virus	Vietnam	*Mungbean*	JX244172
Mungbean yellow mosaic virus	Vietnam	*Mungbean*	JX244173
Mungbean yellow mosaic virus	India	*Blackgram plant*	DQ400848
Mungbean yellow mosaic virus	India	*Blackgram*	KC911721
Mungbean yellow mosaic virus	India	*Vigna mungo*	KP455992
Mungbean yellow mosaic virus	India	*Soybean*	AF314530
Mungbean yellow mosaic virus	India	*Glycine max*	AJ421642
Mungbean yellow mosaic virus	India	*Blackgram*	KC911722
Mungbean yellow mosaic virus	India	*Blackgram*	AJ132575
Mungbean yellow mosaic virus	India	*Blackgram*	KC911717
Mungbean yellow mosaic virus	India	*Blackgram*	KC911718
Mungbean yellow mosaic virus	India	*Blackgram*	KC911723
Okra enation leaf curl virus	Iran	*Papaya*	KJ397529
Okra enation leaf curl virus	Iran	*Papaya*	KJ397530
Okra enation leaf curl virus	Iran	*Papaya*	KJ397531
Okra enation leaf curl virus	Iran	*Papaya*	KJ397532
Okra enation leaf curl virus	Iran	*Papaya*	KJ397527
Okra enation leaf curl virus	Iran	*Papaya*	KJ397528
Okra enation leaf curl virus	Iran	*Papaya*	KJ397533
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390319
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390320

Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390346
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390338
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390341
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390326
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390307
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390327
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390302
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390450
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390339
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390333
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390333
Okra enation leaf curl virus	Pakistan	*Abelmoschus esculentus*	HG518793
Okra enation leaf curl virus	Pakistan	*Abelmoschus esculentus*	HG938358
Okra enation leaf curl virus	Pakistan	*Abelmoschus esculentus*	HG938359
Okra enation leaf curl virus	Pakistan	*Abelmoschus esculentus*	HG938360
Okra enation leaf curl virus	Pakistan	*Abelmoschus esculentus*	HG938361
Okra enation leaf curl virus	Pakistan	*Abelmoschus esculentus*	HG938362
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390309
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390316
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390317
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390315
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390312
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390313
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390310
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	GU111997

Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390303
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390314
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390337
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390331
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390328
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390330
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	GU112001
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	GU112002
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390308
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390306
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KP208672
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KC342220
Okra enation leaf curl virus	Pakistan	*Gossypium hirsutum*	HF567945
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KC019308
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KC019309
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390304
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390305
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	GU111998
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	GU111999
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	GU112000
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390340
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390344
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390457
Okra enation leaf curl virus	India	Abelmoschus esculentus	KT390458
Okra enation leaf curl virus	India	Abelmoschus esculentus	KX553923

Okra enation leaf curl virus	Sri Lanka	Abelmoschus esculentus	KX698093
Okra enation leaf curl virus	Sri Lanka	Abelmoschus esculentus	KX698088
Okra enation leaf curl virus	Sri Lanka	Abelmoschus esculentus	KX698087
Okra enation leaf curl virus	Sri Lanka	Abelmoschus esculentus	KX698091
Okra enation leaf curl virus	Sri Lanka	Abelmoschus esculentus	KX698092
Okra enation leaf curl virus	Sri Lanka	Abelmoschus esculentus	KX698090
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	GU111996
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390318
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390459
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390334
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390342
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390332
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390329
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390454
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390301
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390452
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390460
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390463
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390335
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390336
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390345
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390343
Okra enation leaf curl virus	India	*Abelmoschus esculentus*	KT390311
Okra leaf curl Oman virus	Oman	*Abelmoschus esculentus*	HE862273
Okra leaf curl Oman virus	Oman	*Abelmoschus esculentus*	HF536716

Okra mottle virus	Brazil	*Okra*	EU914819
Okra mottle virus	Brazil	*Glycine max*	FJ686695
Okra mottle virus	Brazil	*Okra*	EU914817
Okra yellow crinkle virus	Cameroon	*Albelmucus esculentus*	FM164724
Okra yellow crinkle virus	Cameroon	*Albelmucus esculentus*	HE793425
Okra yellow crinkle virus	Cameroon	*Albelmucus esculentus*	FM210275
Okra yellow crinkle virus	Cameroon	*Albelmucus esculentus*	HE793424
Okra yellow crinkle virus	Cote d'Ivoire	*Albelmucus esculentus*	KX100571
Okra yellow crinkle virus	Cote d'Ivoire	*Albelmucus esculentus*	KX100572
Okra yellow crinkle virus	Cote d'Ivoire	*Albelmucus esculentus*	KX100573
Okra yellow crinkle virus	Mali	Not specified	DQ902715
Okra yellow crinkle virus	Mali	Not specified	DQ875879
Okra yellow crinkle virus	Mali	*Albelmucus esculentus*	EU024118
Okra yellow mosaic Mexico virus	Mexico	*Abelmoschus esculentus (L.)*	DQ022611
Okra yellow mosaic Mexico virus	USA	*Abelmoschus esculentus*	HM035059
Okra yellow mosaic Mexico virus	Mexico	*Abelmoschus esculentus*	HQ020409
Okra yellow mosaic Mexico virus	Mexico	*Abelmoschus esculentus*	HQ116414
Okra yellow mosaic Mexico virus	Mexico	*Sida*	GU990613
Okra yellow mosaic Mexico virus	Mexico	*Herissantia*	GU990614
Okra yellow mosaic Mexico virus	Mexico	*Sida*	GU990612
Oxalis yellow vein virus	USA	Not specified	KM887907
Papaya leaf curl China virus	China		AY650283
Papaya leaf curl China virus	Vietnam	*Solanum lycorpesicum*	GQ373254
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892673
Papaya leaf curl China virus	Vietnam	*Ageratum conyzoides*	KC878474

Papaya leaf curl China virus	China	*Ageratum conyzoides*	KJ016234
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892669
Papaya leaf curl China virus	China	*Ageratum conyzoides*	AJ558125
Papaya leaf curl China virus	China	*Corchoropsis timentosa*	AJ876548
Papaya leaf curl China virus	China	*Tobacco*	KX273342
Papaya leaf curl China virus	China	*Acalypha australis L.*	KX273343
Papaya leaf curl China virus	China	*Papaya*	HG003651
Papaya leaf curl China virus	China	*Ageratum conyzoides*	KJ016238
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KP195721
Papaya leaf curl China virus	China	*Ageratum conyzoides*	AJ558124
Papaya leaf curl China virus	China	*Lycopersicon esculentum*	AJ558116
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892667
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892672
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892674
Papaya leaf curl China virus	China	*Ageratum conyzoides L.*	JX294075
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892675
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892676
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892677
Papaya leaf curl China virus	Vietnam	*Tobacco*	DQ641700
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892664
Papaya leaf curl China virus	China	*Siegesbeckia orientalis L*	JF682837
Papaya leaf curl China virus	China	*Ageratum conyzoides*	KP685599
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	FN297834
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892657
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892663

Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892662
Papaya leaf curl China virus	China	*Lycopersicon esculentum*	JX128102
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892661
Papaya leaf curl China virus	China	*Lycopersicon esculentum*	JX128101
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892658
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	JX555979
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892659
Papaya leaf curl China virus	China	*Nicotiana tabacum*	KF373768
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892660
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	EU874386
Papaya leaf curl China virus	China	*Lycopersicon esculentum*	AJ558117
Papaya leaf curl China virus	China	*Lycopersicon esculentum*	FN256260
Papaya leaf curl China virus	China	*Lycopersicon esculentum*	AJ704604
Papaya leaf curl China virus	China	*Carica papaya*	AJ811914
Papaya leaf curl China virus	China	*Eclipta prostrata*	AM691553
Papaya leaf curl China virus	China	*Eclipta prostrata*	AM691552
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	AM691554
Papaya leaf curl China virus	China	*Carica papaya*	AJ558123
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892666
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892665
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892670
Papaya leaf curl China virus	China	*Solanum lycorpesicum*	KU892671
Papaya leaf curl Guangdong virus	China	*Carica papaya*	AJ558122
Papaya leaf curl Guangdong virus	China	*Euphorbia pulcherrima*	FJ495184
Papaya leaf curl Guangdong virus	China	*Nicotiana tabacum*	FJ869907

Papaya leaf curl Guangdong virus	South Korea	*Passiflora sp.*	KY884675
Papaya leaf curl Guangdong virus	Taiwan	*Passiflora sp.*	KP876482
Papaya leaf curl Guangdong virus	Taiwan	*Eustoma grandiflorum*	LC089014
Papaya leaf curl Guangdong virus	Taiwan	*Eustoma grandiflorum*	LC089013
Papaya leaf curl Guangdong virus	Taiwan	*Eustoma grandiflorum*	LC089766
Papaya leaf curl Guangdong virus	Philippines	*Blechum pyramidatum*	KF446659
Papaya leaf curl Guangdong virus	Philippines	*Blechum pyramidatum*	KF446660
Papaya leaf curl Guangdong virus	Taiwan	*Eustoma grandiflorum*	LC089766
Papaya leaf curl virus	India	*Solanum lycopersicum*	DQ629103
Papaya leaf curl virus	India	*Papaya*	KY800906
Papaya leaf curl virus	India	*Papaya*	KX302713
Papaya leaf curl virus	Pakistan	*Cyamopsis tetragonoloba*	LT009395
Papaya leaf curl virus	Pakistan	*Rhynchosia capitata*	FM955601
Papaya leaf curl virus	Pakistan	*Rhynchosia capitata*	FM955602
Papaya leaf curl virus	Pakistan	*Physalis peruviana*	LN845920
Papaya leaf curl virus	India	*Crotalaria juncea*	GQ200446
Papaya leaf curl virus	India	*Crotalaria juncea*	GQ200447
Papaya leaf curl virus	India	*Crotalaria juncea*	GQ200448
Papaya leaf curl virus	Pakistan	Not specified	AJ436992
Papaya leaf curl virus	Pakistan	*Cyamopsis tetragonoloba*	LT009399
Papaya leaf curl virus	India	*Carica papaya*	KF307208
Papaya leaf curl virus	India	*Cyamopsis tetragonoloba*	KT253646
Papaya leaf curl virus	India	*Cyamopsis tetragonoloba*	KT253647
Papaya leaf curl virus	India	*Cyamopsis tetragonoloba*	KT253640
Papaya leaf curl virus	India	*Cyamopsis tetragonoloba*	KT253642

Papaya leaf curl virus	India	*Cyamopsis tetragonoloba*	KT253641
Papaya leaf curl virus	India	*Cyamopsis tetragonoloba*	KT253643
Papaya leaf curl virus	India	*Cyamopsis tetragonoloba*	KT253639
Papaya leaf curl virus	India	*Cyamopsis tetragonoloba*	KT253644
Papaya leaf curl virus	India	*Cyamopsis tetragonoloba*	KT253645
Papaya leaf curl virus	India	*Croton bonplandianus*	JN817517
Papaya leaf curl virus	India	*Raphanus sativus* (radish)	FJ593629
Papaya leaf curl virus	India	*Aster alpinus* L.	JQ954859
Papaya leaf curl virus	India	*Amaranthus cruentus* L.	JN135233
Papaya leaf curl virus	India	*Nicotiana glutinosa*	HM143914
Papaya leaf curl virus	India	Not specified	Y15934
Papaya leaf curl virus	India	*Raphanus sativus* (radish)	KY026597
Papaya leaf curl virus	India	*Raphanus sativus* (radish)	KY026598
Papaya leaf curl virus	India	*Solanum lycopersicum*	KU376493
Papaya leaf curl virus	India	*Glycine max*	JN807765
Papaya leaf curl virus	India	*Croton bonplandianus*	KM525657
Papaya leaf curl virus	Pakistan	*Capsicum sp.*	KY978407
Papaya leaf curl virus	Pakistan	*Solanum lycopersicum*	LN878129
Papaya leaf curl virus	India	cherry Solanum lycorpesicum	DQ629102
Papaya leaf curl virus	Pakistan	*Cyamopsis tetragonoloba*	LT009396
Papaya leaf curl virus	Pakistan	*Cyamopsis tetragonoloba*	KU514411
Papaya leaf curl virus	Pakistan	*Cape gooseberry*	LT009400
Papaya leaf curl virus	Pakistan	*Cyamopsis tetragonoloba*	LN845916
Papaya leaf curl virus	Pakistan	*Cyamopsis tetragonoloba*	LN845915
Papaya leaf curl virus	Pakistan	*Cyamopsis tetragonoloba*	LN845917

Papaya leaf curl virus	Pakistan	*Cyamopsis tetragonoloba*	LN845914
Papaya leaf curl virus	Pakistan	*Cyamopsis tetragonoloba*	LT009397
Papaya leaf curl virus	Pakistan	*Cyamopsis tetragonoloba*	LT009398
Papaya leaf curl virus	Pakistan	*Cyamopsis tetragonoloba*	LN845913
Papaya leaf curl virus	Pakistan	*Cyamopsis tetragonoloba*	LN845919
Papaya leaf curl virus	Taiwan	*Euphorbia pulcherrima*	JN703795
Papaya leaf curl virus	Taiwan	*Passiflora edulis*	KC161184
Papaya leaf curl virus	South Korea	Not specified	KT266873
Passionfruit leaf distortion virus	Colombia	*Passiflora edulis f. flavicarpa*	KT899302
Passionfruit severe leaf distortion virus	Brazil	*Passiflora edulis f. flavicarpa*	FJ972767
Pavonia mosaic virus	Brazil	*Pavonia sp.*	KT948785
Pavonia yellow mosaic virus	Brazil	*Pavonia sp.*	KT948787
Pea leaf distortion virus	Nepal	*Pisum sativum*	KY001637
Pea leaf distortion virus	Nepal	*Pisum Sativum*	KY001638
Pea leaf distortion virus	Nepal	*Pisum Sativum*	KY001635
Pea leaf distortion virus	Nepal	*Pisum Sativum*	KY001636
Pea leaf distortion virus	Nepal	*Pisum Sativum*	KY001639
Pea leaf distortion virus	Nepal	*Pisum Sativum*	KY001641
Pea leaf distortion virus	Nepal	*Pisum Sativum*	KY001640
Pedilanthus leaf curl virus	India	*Tabernaemontana coronaria*	JN807764
Pedilanthus leaf curl virus	India	*Cestrum nocturnum*	JQ012790
Pedilanthus leaf curl virus	Pakistan	Not specified	AM712436
Pedilanthus leaf curl virus	Pakistan	*Capsicum sp*	KY978406
Pedilanthus leaf curl virus	India	*Daucus carota*	KX168427
Pedilanthus leaf curl virus	Pakistan	*Solanum lycopersicum*	DQ116884

Pedilanthus leaf curl virus	Pakistan	*Brassica rapa*	LT795117
Pedilanthus leaf curl virus	Pakistan	*Brassica rapa*	LT795118
Pedilanthus leaf curl virus	Pakistan	*Glycine max*	KX671563
Pedilanthus leaf curl virus	Pakistan	*Glycine max*	AM948961
Pedilanthus leaf curl virus	Pakistan	*Sesbania*	LN678638
Pedilanthus leaf curl virus	Pakistan	*Sesbania*	LN713272
Pedilanthus leaf curl virus	Pakistan	*Sesbania*	LN713273
Pedilanthus leaf curl virus	Pakistan	*Spinacia oleracea*	HF568781
Pedilanthus leaf curl virus	Pakistan	*Glycine max*	KX671562
Pedilanthus leaf curl virus	Pakistan	*Glycine max*	KX711622
Pedilanthus leaf curl virus	Pakistan	*Glycine max*	KX671561
Pepper golden mosaic virus	USA	*Pepper golden*	AY928516
Pepper golden mosaic virus	Costa Rica	*Pepper golden*	AF149227
Pepper golden mosaic virus	Costa Rica	*Sweet Pepper*	KY064011
Pepper golden mosaic virus	Costa Rica	*Sweet Pepper*	KY064012
Pepper golden mosaic virus	Costa Rica	*Sweet Pepper*	KY064017
Pepper golden mosaic virus	Costa Rica	*Sweet Pepper*	KY064018
Pepper golden mosaic virus	Costa Rica	*Pepper golden*	JN688724
Pepper golden mosaic virus	Costa Rica	*Capsicum annuum*	JQ743486
Pepper golden mosaic virus	Costa Rica	*Pepper golden*	JN688725
Pepper golden mosaic virus	Costa Rica	*Cervantes*	JN688726
Pepper golden mosaic virus	Costa Rica	*Pepper golden*	JN688727
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848781
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848779
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848780

Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848790
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848791
Pepper golden mosaic virus	USA	*Pepper golden*	AY928512
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848756
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848788
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848793
Pepper golden mosaic virus	Mexico	*Capsicum annuum*	GU564594
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848760
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848759
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848787
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848761
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848762
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848789
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848773
Pepper golden mosaic virus	Mexico	*Pepper*	U57457
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848764
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848763
Pepper golden mosaic virus	USA	*Pepper*	EF210556
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848752
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848786
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848757
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848776
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848777
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848778
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848758

Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848751
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848794
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848796
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848772
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848755
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848753
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848754
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848771
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848785
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848784
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848783
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848782
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848774
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848775
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848795
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848770
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848765
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848766
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848768
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848767
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848769
Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848797
Pepper golden mosaic virus	USA	*Pepper golden*	AY928514
Pepper golden mosaic virus	Mexico	*Solanum lycorpesicum*	GU128148
Pepper golden mosaic virus	Mexico	*Pepper*	GU128149

Pepper golden mosaic virus	Mexico	*Capsicum annuum var. glabriusculum*	LN848792
Pepper leaf curl virus	India	*Chilli*	EF190217
Pepper leaf curl virus	India	*Chilli*	JN663870
Pepper leaf curl virus	India	*Chilli*	KJ957157
Pepper leaf curl virus	Bangladesh	Not specified	AF314531
Pepper leaf curl virus	India	*Chilli*	HM007111
Pepper leaf curl virus	Pakistan	*Chilli*	DQ116881
Pepper leaf curl virus	India	*Chilli*	HM007101
Pepper leaf curl virus	India	*Chilli*	HM007097
Pepper leaf curl virus	India	*Chilli*	JN663853
Pepper leaf curl virus	India	*Chilli*	HM007096
Pepper leaf curl virus	Pakistan	*Chilli*	KY420149
Pepper leaf curl virus	Thailand	*Chilli*	AF134484
Pepper leaf curl virus	Malaysia	*Chilli*	AF414287
Pepper leaf curl Yunnan virus	China	*Solanum lycorpesicum*	KU975395
Pepper leaf curl Yunnan virus	China	*Capsicum annuum*	EU585781
Pepper leaf curl Yunnan virus	China	*Solanum lycorpesicum*	KU601621
Pepper yellow leaf curl Thailand virus	Thailand	*Capsicum annuum*	KT322142
Pepper yellow leaf curl Thailand virus	Thailand	*Capsicum annuum*	KT322143
Pepper yellow leaf curl Thailand virus	Thailand	*Bemisia tabaci*	KX943290
Pepper yellow leaf curl Thailand virus	Thailand	*Capsicum annuum*	KT322141
Pepper yellow leaf curl Thailand virus	Thailand	*Capsicum annuum*	KT322146
Pepper yellow leaf curl Thailand virus	Thailand	*Capsicum annuum*	KT322145
Pepper yellow leaf curl virus	Indonesia	*Capsicum annuum*	KT809345
Pepper yellow leaf curl virus	Indonesia	*Capsicum annuum*	KT809346

Pepper yellow leaf curl virus	China	*Pepper*	KC149938
Pepper yellow vein Mali virus	Burkina Faso	*Capsicum annuum var. annuum*	FM876849
Pepper yellow vein Mali virus	Cote d'Ivoire	*Capsicum sp.*	KY271075
Pepper yellow vein Mali virus	Cote d'Ivoire	*Capsicum sp.*	KY271076
Pepper yellow vein Mali virus	Cote d'Ivoire	*Capsicum sp.*	KY271077
Pepper yellow vein Mali virus	Mali	Not specified	AY502935
Pepper yellow vein Mali virus	Burkina Faso	*Capsicum annuum var. annuum*	FM876847
Pepper yellow vein Mali virus	Burkina Faso	*Capsicum frutescens*	FN555172
Pepper yellow vein Mali virus	Burkina Faso	*Capsicum frutescens*	FN555173
Pepper yellow vein Mali virus	Burkina Faso	*Capsicum frutescens*	FN555174
Pepper yellow vein Mali virus	Burkina Faso	*Capsicum frutescens*	FM876852
Pepper yellow vein Mali virus	Burkina Faso	*Capsicum frutescens*	FM876850
Pepper yellow vein Mali virus	Burkina Faso	*Capsicum frutescens*	FM876851
Pepper yellow vein Mali virus	Burkina Faso	*Capsicum frutescens*	FM876848
Pepper yellow vein Mali virus	Burkina Faso	*Capsicum frutescens*	FN555171
Pepper yellow vein Mali virus	China	*Bougainvillea*	AM691549
Pepper yellow vein Mali virus	China	*Phyllanthus urinaria*	AM691550
Pepper yellow vein Mali virus	China	*Eclipta prostrata*	AM691547
Pepper yellow vein Mali virus	China	*Capsicum sp.*	AM691548
Pepper yellow vein Mali virus	China	*Eclipta prostrata*	AM691555
Potato yellow mosaic Panama virus	Panama	Not specified	Y15034
Potato yellow mosaic virus	USA	*Solanum lycorpesicum*	AF039031
Potato yellow mosaic virus	Grenada	*Solanum lycopersicum*	FR851299
Potato yellow mosaic virus	Grenada	*Solanum lycopersicum*	FR851300
Potato yellow mosaic virus	Colombia	*Solanum lycopersicum*	EU518935

Potato yellow mosaic virus	Colombia	*Solanum lycopersicum*	JQ045705
Potato yellow mosaic virus	USA	Not specified	AY120882
Potato yellow mosaic virus	Puerto Rico	Not specified	AY965897
Potato yellow mosaic virus	Venezuela	Not specified	D00940
Potato yellow mosaic virus	Venezuela	*Solanum americanum*	KU665804
Potato yellow mosaic virus	Venezuela	*Solanum americanum*	KX389269
Pouzolzia golden mosaic virus	Taiwan	*Pouzolzia zeylanica*	KU358528
Pouzolzia golden mosaic virus	Taiwan	*Pouzolzia zeylanica*	KU358527
Pouzolzia golden mosaic virus	Taiwan	*Pouzolzia zeylanica*	KF927128
Pouzolzia golden mosaic virus	Taiwan	*Pouzolzia zeylanica*	KU358529
Pouzolzia golden mosaic virus	Vietnam	*Pouzolzia zeylanica*	KC857508
Pouzolzia golden mosaic virus	China	*Pouzolzia zeylanica*	JX183732
Pouzolzia golden mosaic virus	China	*Pouzolzia zeylanica*	JX183733
Pouzolzia mosaic Guangdong virus	China	*Pouzolzia zeylanica*	KF414123
Premna leaf curl virus	Vietnam	*Premna serratifolia L.*	JQ793786
Pumpkin yellow mosaic Malaysia virus	Malaysia	Not specified	EF197941
Radish leaf curl virus	India	*Capsicum annuum*	HQ682190
Radish leaf curl virus	India	*Radish*	EF175733
Radish leaf curl virus	India	*Bhendi*	GU732203
Radish leaf curl virus	India	*Okra*	HQ257375
Radish leaf curl virus	India	*Okra*	JQ411026
Radish leaf curl virus	India	*Tobaco*	EU194914
Ramie mosaic virus	China	*Ramie*	KC171652
Ramie mosaic virus	China	Not specified	FN396971
Ramie mosaic virus	China	*Ramie*	KX885030

Ramie mosaic virus	Chian	*Nicotiana tabacum*	EF125190
Ramie mosaic virus	China	*Ramie*	EU596959
Ramie mosaic virus	China	*Ramie*	KC171650
Ramie mosaic Yunnan virus	China	*Boehmeria*	KU522485
Rhynchosai mild mosaic virus	Puerto Rico	*Rhynchosia minima*	FJ944019
Rhynchosia golden mosaic Havana virus	Cuba	*Rhynchosia minima*	HM236368
Rhynchosia golden mosaic Sinaloa virus	Mexico	*Rhynchosia minima*	DQ406672
Rhynchosia golden mosaic virus	Honduras	*Rhynchosia mínima*	AF239671
Rhynchosia golden mosaic virus	Mexico	*Tobacco*	AF408199
Rhynchosia golden mosaic virus	Mexico	*Soybean*	EU339936
Rhynchosia golden mosaic virus	Mexico	*Asteraceae*	EU339939
Rhynchosia golden mosaic virus	Mexico	*Soybean*	DQ347950
Rhynchosia golden mosaic virus	Mexico	*Rhynchosia mínima*	EU339938
Rhynchosia golden mosaic Yucatan virus	Mexico	*Rhynchosia minima*	EU021216
Rhynchosia golden mosaic Yucatan virus	Mexico	*Desmodium sp.*	GQ352453
Rhynchosia golden mosaic Yucatan virus	Jamaica	*Rhyncosia*	KP641347
Rhynchosia golden mosaic Yucatan virus	Jamaica	*Rhyncosia*	KP641349
Rhynchosia golden mosaic Yucatan virus	Cuba	*Glycine max*	KT192632
Rhynchosia golden mosaic Yucatan virus	Cuba	*Soybean*	KT381193
Rhynchosia rugose golden mosaic virus	Cuba	*Rhynchosia minima*	HM236370
Rhynchosia rugose golden mosaic virus	Cuba	*Rhynchosia minima*	HM236370
Rhynchosia yellow mosaic virus	India	*French bean*	KP752090
Rhynchosia yellow mosaic virus	Pakistan	*Rhynchosia minima*	AM999981
Rhynchosia yellow mosaic virus	Pakistan	*Rhynchosia minima*	FM208847
Rose leaf curl virus	India	*Rosa sp.*	KF584008

Rose leaf curl virus	India	Not specified	KJ739692
Rose leaf curl virus	Pakistan	*Nicotiana benthamiana*	GQ478342
Senecio yellow mosaic virus	China	*Senecio scandens*	AJ876550
Senna leaf curl virus	India	*Senna occidentalis*	KU852742
Sida angular mosaic virus	Brazil	*Sida acuta*	KX691404
Sida angular mosaic virus	Brazil	*Sida sp.*	KX691406
Sida angular mosaic virus	Brazil	*Sida acuta*	KX691408
Sida angular mosaic virus	Brazil	*Sida spinosa*	KX691403
Sida angular mosaic virus	Brazil	*Sida acuta*	KX691407
Sida Brazil virus	Brazil	*Sida sp.*	FN436001
Sida Brazil virus	Argentina	*Bean*	KY555798
Sida bright yellow mosaic virus	Brazil	*Sida sp.*	KX348184
Sida chlorotic mottle virus	Brazil	*Sida sp.*	KX348183
Sida chlorotic vein virus	Brazil	*Sida urens*	KX691402
Sida chlorotic vein virus	Brazil	*Sida urens*	KX691405
Sida ciliares golden mosaic virus	Venezuela	*Sida ciliaris*	JX857691
Sida common mosaic virus	Brazil	*Sida micrantha*	JX871372
Sida common mosaic virus	Brazil	*Sida rhombifolia*	EU710751
Sida common mosaic virus	Brazil	*Sida micrantha*	KC706531
Sida common mosaic virus	Brazil	*Sida micrantha*	JX871373
Sida common mosaic virus	Brazil	*Sida micrantha*	JX871370
Sida common mosaic virus	Brazil	*Sida micrantha*	JX871371
Sida golden mosaic virus	USA	*Sida*	AF049336
Sida golden mosaic virus	USA	*Phaseolus vulgaris*	GQ357649
Sida golden mosaic Buckup virus	Jamaica	*Sida sp*	JX162592

Sida golden mosaic Buckup virus	Jamaica	*Sida*	HQ008338
Sida golden mosaic Buckup virus	Jamaica	*Sida sp.*	JX162591
Sida golden mosaic Florida virus	Cuba	*Sida spp.*	HE806442
Sida golden mosaic Florida virus	Cuba	*Malvastrum coromandelianum*	HM003779
Sida golden mosaic Florida virus	Cuba	*Malvastrum coromandelianum*	HM359015
Sida golden mosaic virus	USA: Florida	*Bemisia tabaci*	HM626517
Sida golden mosiac Costa Rica virus	Costa Rica	Not specified	X99550
Sida golden mottle virus	USA	*Sida santaremensis*	GU997691
Sida golden yellow spot virus	Brazil	*Sida sp.*	KX348185
Sida leaf curl virus	China	Not specified	AM050730
Sida leaf curl virus	Vietnam	*Abutilon indicum*	DQ641706
Sida micrantha mosaic virus	Brazil	*Sida sp.*	JX415187
Sida micrantha mosaic virus	Brazil	*Sida santaremensis*	JX415194
Sida micrantha mosaic virus	Brazil	*Sida santaremensis*	JX415195
Sida micrantha mosaic virus	Bolívia	*Sidastrum micranthum*	HM585433
Sida micrantha mosaic virus	Brazil	*Sida micrantha*	FN436005
Sida micrantha mosaic virus	Brazil	*Sida rhombifolia*	FN436003
Sida micrantha mosaic virus	Brazil	*Sida sp.*	KX348155
Sida micrantha mosaic virus	Brazil	*Sida sp.*	KX348156
Sida micrantha mosaic virus	Brazil	*Sida sp.*	KX348158
Sida micrantha mosaic virus	Brazil	*Sida sp.*	KX348159
Sida micrantha mosaic virus	Brazil	*Sida sp.*	KX348160
Sida micrantha mosaic virus	Brazil	*Oxalis sp.*	KY650717
Sida micrantha mosaic virus	Brazil	*Sida sp.*	KX348164
Sida micrantha mosaic virus	Brazil	*Sida sp.*	KX348157

Sida micrantha mosaic virus	Brazil	*Sida sp.*	KX348163
Sida micrantha mosaic virus	Brazil	*Sida sp.*	KX348161
Sida micrantha mosaic virus	Brazil	*Sida sp.*	KX348162
Sida micrantha mosaic virus	Bolivia	*Sida rhombifolia*	HM585431
Sida micrantha mosaic virus	Bolivia	*Sida rhombifolia*	HM585437
Sida micrantha mosaic virus	Bolivia	*Sida rhombifolia*	HM585439
Sida micrantha mosaic virus	Brazil	*Phaseolus vulgaris*	HM357459
Sida micrantha mosaic virus	Brazil	*Solanum lycopersicum*	AJ557451
Sida micrantha mosaic virus	Brazil	*Solanum lycopersicum*	KC706536
Sida micrantha mosaic virus	Brazil	*Glycine max*	KU852503
Sida micrantha mosaic virus	Brazil	*Sida sp.*	KX691410
Sida micrantha mosaic virus	Brazil	*Glycine max*	FJ686693
Sida micrantha mosaic virus	Brazil	*Sida spinosa*	KX691401
Sida micrantha mosaic virus	Brazil	*Okra*	EU908733
Sida micrantha mosaic virus	Brazil	*Oxalis sp.*	KY650722
Sida micrantha mosaic virus	Brazil	*Solanum lycopersicum*	KC706535
Sida micrantha mosaic virus	Brazil	*Solanum lycopersicum*	KC706537
Sida micrantha mosaic virus	Brazil	*Sida micrantha*	AJ557450
Sida micrantha mosaic virus	Brazil	*Sida micrantha*	FN557522
Sida mosaic Bolivia virus	Bolivia	*Sida micrantha*	HM585443
Sida mosaic Bolivia virus	Argentina	*Salvia hispanica*	KJ742421
Sida mosaic Bolivia virus	Bolivia	*Sida micrantha*	HM585441
Sida mosaic Sinaloa virus	Mexico	*Sida sp.*	DQ520944
Sida mosaic Sinaloa virus	Mexico	*Solanum lycopersicum*	KX440612
Sida mosaic Sinaloa virus	Mexico	*Solanum lycopersicum*	KX440613

Sida mottle Alagoas virus	Brazil	*Sida sp.*	JX871386
Sida mottle Alagoas virus	Brazil	*Sida sp.*	JX871387
Sida mottle Alagoas virus	Brazil	*Sida sp.*	JX871388
Sida mottle Alagoas virus	Brazil	*Sida urens*	JX871384
Sida mottle Alagoas virus	Brazil	*Sida urens*	JX871385
Sida mottle Alagoas virus	Brazil	*Sida sp.*	KX896423
Sida mottle Alagoas virus	Brazil	*Sida sp.*	KX896422
Sida mottle Alagoas virus	Brazil	*Sida sp.*	KX896424
Sida mottle Alagoas virus	Brazil	*Sida sp.*	KX896425
Sida mottle Alagoas virus	Brazil	*Sida sp.*	KX896426
Sida mottle Alagoas virus	Brazil	*Sida sp.*	KX896427
Sida mottle Alagoas virus	Brazil	*Sida sp.*	KX896417
Sida mottle Alagoas virus	Brazil	*Sida sp.*	KX896416
Sida mottle Alagoas virus	Brazil	*Sida sp.*	KX896415
Sida mottle Alagoas virus	Brazil	*Sida sp.*	KX896418
Sida mottle Alagoas virus	Brazil	*Sida sp.*	KX896421
Sida mottle Alagoas virus	Brazil	*Sida sp.*	KX896419
Sida mottle Alagoas virus	Brazil	*Sida sp.*	KX896420
Sida yellow golden mosaic virus	Brazil	*Sida sp.*	MF163258
Sida yellow mosaic Alagoas virus	Brazil	*Sida urens*	JX871383
Sida yellow mosaic virus	Brazil	*Sida santaremensis*	JX871369
Sida yellow mosaic virus	Brazil	*Sida sp.*	AY090558
Sida yellow mosaic virus	India	*Sida sp.*	KX513859
Sida yellow mosaic virus	China	*Sida acuta*	AJ810096
Sida yellow mosaic virus	China	*Sida acuta*	AM048837

Sida yellow mosaic virus	Vietnan	*Arrow leaf*	DQ641696
Sida yellow mosaic virus	China	*Sida acuta*	KF990601
Sida yellow mosaic Yucatan virus	Mexico	*Sida acuta*	DQ875872
Sida yellow mottle virus	Cuba	*Sida micrantha*	HE806448
Sida yellow mottle virus	Cuba	*Sida rhombifolia*	JN411687
Sida yellow mottle virus	Cuba	*Sida rhombifolia*	HQ822123
Sida yellow net virus	Brazil	*Solanum lycopersicum*	KU996356
Sida yellow net virus	Brazil	*Solanum lycopersicum*	KU996357
Sida yellow net virus	Brazil	*Sida micrantha*	JX871376
Sida yellow net virus	Brazil	*Solanum lycorpesicum*	KT957957
Sida yellow net virus	Brazil	*Solanum lycopersicum*	KU996355
Sida yellow vein virus	Honduras	Not specified	Y11099
Sidastrum golden leaf spot virus	Brazil	*Sidastrum sp.*	HM357458
Siegesbeckia yellow vein Guangxi virus	China	*Siegesbeckia glabrescens*	AM238692
Siegesbeckia yellow vein virus	China	*Siegesbeckia glabrescens*	KF499589
Siegesbeckia yellow vein virus	China	*Siegesbeckia glabrescens*	JX294076
Siegesbeckia yellow vein virus	China	*Siegesbeckia orientalis L*	JF682838
Siegesbeckia yellow vein virus	China	*Siegesbeckia glabrescens*	AM230634
Siegesbeckia yellow vein virus	China	*Siegesbeckia glabrescens*	AM183224
Siegesbeckia yellow vein virus	China	*Siegesbeckia glabrescens*	AM230635
Solanum mosaic Bolivia virus	Bolivia	*Solanum*	HM585435
Solanum mosaic Bolivia virus	Argentina	*Solanum lycorpesicum*	KJ592721
South African cassava mosaic virus	South Africa	Not specified	AF155806
South African cassava mosaic virus	Zimbabwe	*Manihot esculenta*	AJ575560
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888032

South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888041
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888046
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888046
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888034
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888057
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887845
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887886
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887981
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887961
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887923
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887937
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887952
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887934
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888017
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887933
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887928
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887868
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888000
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887920
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887926
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888042
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887935
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887919
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887996
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888023

South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888037
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887917
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887827
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887921
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887922
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887918
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887927
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887864
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887915
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887924
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888022
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887826
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887855
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888015
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	AJ422132
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888002
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887820
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888001
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888043
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888044
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888045
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887936
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887925
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887916
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887999

South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887942
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887940
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887941
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887968
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887967
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887969
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887958
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887965
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888054
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887992
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888040
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888021
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888052
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887970
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888056
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888019
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887929
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888027
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888020
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887839
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887985
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887931
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887932
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888039
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888095

South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888097
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888026
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887848
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887991
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887998
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887983
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888024
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888036
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888089
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888090
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888093
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888094
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887840
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887859
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887853
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887990
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887993
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887994
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888029
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888031
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888028
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887892
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887857
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887986
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887982

South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887984
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887971
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887989
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887987
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887988
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887862
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888009
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888011
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887890
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888016
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888013
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888003
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888012
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888006
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888007
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888004
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888005
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888014
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888030
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887841
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887851
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888063
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888025
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888033
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888018

South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887902
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ888010
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887972
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887869
South African cassava mosaic virus	Madagascar	*Manihot esculenta*	KJ887871
Soybean blistering mosaic virus	Argentina	*Soybean*	EF016486
Soybean chlorotic blotch virus	Nigeria	*Phaseolus lunatus L.*	KC508642
Soybean chlorotic blotch virus	Nigeria	*Soybean*	GQ472985
Soybean chlorotic blotch virus	Nigeria	*Centrosema pubescens*	GQ472987
Soybean chlorotic blotch virus	Cameroon	*Centrosema pubescens*	KT444617
Soybean chlorotic blotch virus	Cameroon	*Okra*	KT444615
Soybean chlorotic blotch virus	Togo	*Cassava*	KT454813
Soybean chlorotic blotch virus	Togo	*Solanum lycorpesicum*	KT454815
Soybean chlorotic blotch virus	Nigeria	*Phaseolus lunatus L.*	KC508643
Soybean chlorotic blotch virus	Nigeria	*Centrosema pubescens*	KT454809
Soybean chlorotic blotch virus	Cameroon	*Cassava*	KT444613
Soybean chlorotic blotch virus	Togo	*Sida cordifolia*	KT454811
Soybean chlorotic blotch virus	Benin	*Asystasia*	KT454817
Soybean chlorotic blotch virus	Nigeria	*Sida acuta*	KT444611
Soybean chlorotic spot virus	Brazil	*Glycine max*	JX122965
Soybean chlorotic spot virus	Brazil	*Macroptilium lathyroides*	KJ939916
Soybean chlorotic spot virus	Brazil	*Macroptilium lathyroides*	KJ939917
Soybean chlorotic spot virus	Brazil	*Macroptilium lathyroides*	KJ939918
Soybean crinkle leaf virus	Japan	*Solanum lycorpesicum*	AB050781
Soybean mild mottle virus	Nigeria	*Soybean*	GQ472984

Spilanthes yellow vein virus	Vietnam	*Spilanthes paniculata*	DQ641694
Spinach yellow vein virus	India	*Spinach*	KF660223
Squash leaf curl China virus	India	*Pumpkin*	JN587811
Squash leaf curl China virus	India	*Pumpkin*	DQ026296
Squash leaf curl China virus	India	*Pumpkin*	EU573715
Squash leaf curl China virus	India	*Pumpkin*	GU967381
Squash leaf curl China virus	India	*Pumpkin*	AY184487
Squash leaf curl China virus	India	*Benincasa hispida*	KF188433
Squash leaf curl China virus	India	*Jasmine*	MF102264
Squash leaf curl China virus	Philippines	*Chayote*	EU487031
Squash leaf curl China virus	Malaysia	Not specified	EF197940
Squash leaf curl China virus	China	*Cucurbita moschata*	MG525551
Squash leaf curl China virus	China	Not specified	AB027465
Squash leaf curl China virus	China	Not specified	AM260206
Squash leaf curl China virus	Thailand	*Wax gourd*	EU543562
Squash leaf curl China virus	China	*Cucurbita moschata*	KC171648
Squash leaf curl China virus	Thailand	*Pumpkin*	AB330078
Squash leaf curl China virus	Vietnam	*Cucurbita moschata*	KC857509
Squash leaf curl China virus	Vietnam	Not specified	AF509741
Squash leaf curl China virus	China	*Cucumis melo var. saccharinus*	KF184992
Squash leaf curl China virus	Vietnam	Not specified	AF509743
Squash leaf curl China virus	China	*Cucumis melo var. saccharinus*	KF184993
Squash leaf curl China virus	China	*Squash*	KF999983
Squash leaf curl China virus	China	*Cucumis melo*	HM566112
Squash leaf curl China virus	China	*Pumpkin*	MF062251

Squash leaf curl China virus	China	Not specified	AM260205
Squash leaf curl Philippines virus	Philippines	*Squash*	EU487033
Squash leaf curl Philippines virus	Philippines	*Pumpkin*	EU487041
Squash leaf curl Philippines virus	Philippines	*Cucurbita moschata*	AB085793
Squash leaf curl Philippines virus	Taiwan	*Benincasa hispida*	EU310406
Squash leaf curl Philippines virus	Taiwan	*Sechium edule*	JF746195
Squash leaf curl Philippines virus	Philippines	*Pumpkin*	DQ866135
Squash leaf curl Philippines virus	Philippines	*Cucurbita moschata*	EF199774
Squash leaf curl virus	Costa Rica	*Cucurbita sp.*	M38183
Squash leaf curl Yunnan virus	China	*Not specified*	AJ420319
Squash leaf curl Yunnan virus	Thailand	*Pumpkin*	KX388157
Squash yellow mild mottle virus	Costa Rica	*Cucurbita sp.*	KC153490
Sri Lankan cassava mosaic virus	India	Not specified	AJ890226
Sri Lankan cassava mosaic virus	India	*Monihot esculenta*	KR611577
Sri Lankan cassava mosaic virus	India	*Monihot esculenta*	AJ890228
Sri Lankan cassava mosaic virus	India	*Monihot esculenta*	AJ607394
Sri Lankan cassava mosaic virus	India	*Monihot esculenta*	KF898349
Sri Lankan cassava mosaic virus	India	*Monihot esculenta*	KP455486
Sri Lankan cassava mosaic virus	India	*Monihot esculenta*	AJ890227
Sri Lankan cassava mosaic virus	India	*Monihot esculenta*	AJ890229
Sri Lankan cassava mosaic virus	India	*Monihot esculenta*	KC424490
Sri Lankan cassava mosaic virus	India	*Monihot esculenta*	AJ579307
Sri Lankan cassava mosaic virus	Cambodia	*Monihot esculenta*	KT861468
Sri Lankan cassava mosaic virus	India	*Monihot esculenta*	KR611579
Sri Lankan cassava mosaic virus	India	*Monihot esculenta*	AJ890224

Sri Lankan cassava mosaic virus	India	*Monihot esculenta*	AJ890225
Sri Lankan cassava mosaic virus	India	*Monihot esculenta*	KU550961
Sri Lankan cassava mosaic virus	Sri Lankan	*Nicotiana benthamiana*	AJ314737
Sri Lankan cassava mosaic virus	India	*Monihot esculenta*	KP455484
Stachytarpheta leaf curl virus	China	*Lycopersicon esculentum*	GQ169042
Stachytarpheta leaf curl virus	China	*Tachytarpheta*	AJ564742
Stachytarpheta leaf curl virus	China	*Stachytarpheta jamaicensis*	AJ495814
Stachytarpheta leaf curl virus	China	*Stachytarpheta*	AJ564743
Stachytarpheta leaf curl virus	China	*Stachytarpheta*	AJ810156
Stachytarpheta leaf curl virus	China	*Stachytarpheta*	AJ810157
Sweet potato leaf curl virus	Jamaica	*Ipomoea batatas*	KC253235
Sweet potato leaf curl virus	China	*Ipomoea batatas*	KU323597
Sweet potato leaf curl Bengal virus	India	*Ipomoea batatas*	FN432356
Sweet potato leaf curl Canary virus	China	*Sweet potato*	KX033435
Sweet potato leaf curl Canary virus	China	*Sweet potato*	KU992909
Sweet potato leaf curl Canary virus	China	*Sweet potato*	KX033430
Sweet potato leaf curl Canary virus	Spain	*Ipomoea batatas*	EF456742
Sweet potato leaf curl Canary virus	Spain	*Ipomoea batatas*	EF456745
Sweet potato leaf curl Canary virus	Spain	*Ipomoea batatas*	EU856365
Sweet potato leaf curl Canary virus	Spain	*Ipomoea batatas*	FJ529203
Sweet potato leaf curl China virus	China	*Sweet potato*	KJ013576
Sweet potato leaf curl China virus	China	*Sweet potato*	KX033439
Sweet potato leaf curl China virus	China	Sweet potato	JF736657
Sweet potato leaf curl China virus	China	*Sweet potato*	KX033440
Sweet potato leaf curl China virus	China	*Sweet potato*	DQ512731

Sweet potato leaf curl Georgia virus	Argentina	*Sweet potato*	KX611145
Sweet potato leaf curl Georgia virus	China	*Ipomoea purpurea*	KF769447
Sweet potato leaf curl Georgia virus	China	*Sweet potato*	KX033420
Sweet potato leaf curl Georgia virus	China	*Sweet potato*	KX033429
Sweet potato leaf curl Georgia virus	China	*Sweet potato*	KX033429
Sweet potato leaf curl Georgia virus	China	*Sweet potato*	KX033431
Sweet potato leaf curl Georgia virus	China	*Sweet potato*	KX033436
Sweet potato leaf curl Georgia virus	China	*Sweet potato*	KX033418
Sweet potato leaf curl Georgia virus	China	*Ipomoea batatas*	JX448368
Sweet potato leaf curl Georgia virus	China	*Sweet potato*	KJ013563
Sweet potato leaf curl Georgia virus	China	*Sweet potato*	KX033442
Sweet potato leaf curl Georgia virus	China	*Sweet potato*	KJ013583
Sweet potato leaf curl Georgia virus	China	*Sweet potato*	KX033423
Sweet potato leaf curl Georgia virus	China	*Sweet potato*	KX033433
Sweet potato leaf curl Georgia virus	China	*Ipomoea batatas*	A326775
Sweet potato leaf curl Georgia virus	Cuba	*Ipomoea batatas*	KC253236
Sweet potato leaf curl Guangxi virus	China	*Sweet potato*	KJ476508
Sweet potato leaf curl Guangxi virus	China	*Sweet potato*	KJ476510
Sweet potato leaf curl Henan virus	China	*Ipomoea batatas*	KC907406
Sweet potato leaf curl Henan virus	China	*Sweet potato*	KJ476507
Sweet potato leaf curl Japan virus	China	*Sweet potato*	KJ013561
Sweet potato leaf curl Japan virus	China	*Sweet potato*	KJ013562
Sweet potato leaf curl Japan virus	China	*Sweet potato*	KJ013560
Sweet potato leaf curl Japan virus	China	*Sweet potato*	KJ013555
Sweet potato leaf curl Japan virus	China	*Sweet potato*	KJ013559

Sweet potato leaf curl Japan virus	China	*Sweet potato*	KJ013556
Sweet potato leaf curl Japan virus	China	*Sweet potato*	KJ013558
Sweet potato leaf curl Korean virus	South Korea	*Ipomoea batatas*	FJ560719
Sweet potato leaf curl Lanzarote virus	Spain	*Ipomoea batatas*	EF456746.
Sweet potato leaf curl Lanzarote virus	Spain	*Ipomoea batatas*	EU839579
Sweet potato leaf curl São Paulo virus	Brazil	*Ipomoea batatas*	HQ393477
Sweet potato leaf curl São Paulo virus	South Africa	*Ipomoea batatas*	JQ621844
Sweet potato leaf curl São Paulo virus	South Africa	*Ipomoea batatas*	KX859238
Sweet potato leaf curl São Paulo virus	Tanzania	*Ipomoea batatas*	KF836891
Sweet potato leaf curl Shanghai virus	China	*Sweet potato*	KJ013581
Sweet potato leaf curl Shanghai virus	China	*Ipomoea batatas*	KF040467
Sweet potato leaf curl Shanghai virus	China	*Ipomoea batatas*	KF040468
Sweet potato leaf curl Sichuan virus	China	*Ipomoea batatas*	KC488316
Sweet potato leaf curl Sichuan virus	China	*Ipomoea batatas*	KF156759
Sweet potato leaf curl South Carolina virus	USA	*Ipomoea batatas*	HQ333144
Sweet potato leaf curl Spain virus	Brazil	*Ipomoea batatas*	HQ393458
Sweet potato leaf curl Spain virus	Brazil	*Ipomoea batatas*	HQ393448
Sweet potato leaf curl Spain virus	Spain	*Ipomoea indica*	FJ151200
Sweet potato leaf curl Spain virus	Spain	*Ipomoea batatas*	EF456741
Sweet potato leaf curl Spain virus	Spain	*Ipomoea batatas*	EF456743
Sweet potato leaf curl Uganda virus	Uganda	*Ipomoea setosa cv.*	FR751068
Sweet potato leaf curl virus	Mexico	*Ipomoea batatas*	KC253237
Sweet potato leaf curl virus	South Korea	*Ipomoea batatas*	JX961671
Sweet potato leaf curl virus	South Korea	*Ipomoea batatas*	JX961674
Sweet potato leaf curl virus	South Korea	*Ipomoea batatas*	KT992066

Sweet potato leaf curl virus	South Korea	*Ipomoea batatas*	JX961673
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992062
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992048
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992057
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992052
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992054
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992063
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992060
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992065
Sweet potato leaf curl virus	Greece	*Ipomoea indica*	KF697071
Sweet potato leaf curl virus	Spain	Unidentified plant	KT099145
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	FJ969829
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	FJ969830
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393447
Sweet potato leaf curl virus	Peru	*Ipomoea batatas*	KC253234
Sweet potato leaf curl virus	China	*Sweet potato*	KX033444
Sweet potato leaf curl virus	China	Not specified	EU309693
Sweet potato leaf curl virus	China	*Sweet potato*	KX033446
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	FJ969832
Sweet potato leaf curl virus	Portugal	*Ipomoea indica*	MG254542
Sweet potato leaf curl virus	Portugal	*Ipomoea indica*	MG254543
Sweet potato leaf curl virus	Greece	*Ipomoea indica*	KF697069
Sweet potato leaf curl virus	Greece	*Ipomoea indica*	KF697070
Sweet potato leaf curl virus	Venezuela	*Merremia dissecta*	KF716172
Sweet potato leaf curl virus	Spain	Unidentified plant	KT099144

Sweet potato leaf curl virus	India	*Sweet potato*	KM050768
Sweet potato leaf curl virus	Spain	*Ipomoea batatas*	EU856364
Sweet potato leaf curl virus	Spain	*Ipomoea batatas*	EF456744
Sweet potato leaf curl virus	Spain	*Ipomoea batatas*	EU856366
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	FJ969833
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992055
Sweet potato leaf curl virus	China	*Sweet potato*	KX033432
Sweet potato leaf curl virus	China	*Sweet potato*	KX056486.
Sweet potato leaf curl virus	Puerto Rico	Unidentified plant	KT099140
Sweet potato leaf curl virus	Puerto Rico	Unidentified plant	KT099143
Sweet potato leaf curl virus	Puerto Rico	Unidentified plant	KT099133
Sweet potato leaf curl virus	China	*Sweet potato*	EU267799
Sweet potato leaf curl virus	China	*Ipomoea purpurea*	EU253456
Sweet potato leaf curl virus	China	*Ipomoea indica*	FN806776
Sweet potato leaf curl virus	India	*Ipomoea purpurea*	JX050197
Sweet potato leaf curl virus	India	*Ipomoea purpurea*	JX050196
Sweet potato leaf curl virus	India	*Ipomoea purpurea*	JX050195
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393473
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393476
Sweet potato leaf curl virus	USA	*Ipomoea batatas*	HQ333136
Sweet potato leaf curl virus	USA	*Ipomoea batatas*	HQ333138
Sweet potato leaf curl virus	USA	*Ipomoea batatas*	HQ333135
Sweet potato leaf curl virus	USA	*Ipomoea batatas*	HQ333137
Sweet potato leaf curl virus	Japan	Not specified	AB433786
Sweet potato leaf curl virus	Japan	Not specified	AB433787

Sweet potato leaf curl virus	China	*Sweet potato*	JX286654
Sweet potato leaf curl virus	China	*Sweet potato*	JX286653
Sweet potato leaf curl virus	China	*Sweet potato*	JX286655
Sweet potato leaf curl virus	China	*Ipomoea batatas*	KF040464
Sweet potato leaf curl virus	China	*Sweet potato*	KJ013570
Sweet potato leaf curl virus	China	*Ipomoea purpurea*	FJ515896
Sweet potato leaf curl virus	China	*Ipomoea purpurea*	FJ515897
Sweet potato leaf curl virus	China	*Ipomoea purpurea*	FJ515898
Sweet potato leaf curl virus	China	*Sweet potato*	KJ013564
Sweet potato leaf curl virus	China	*Ipomoea batatas*	KF040466
Sweet potato leaf curl virus	China	*Sweet potato*	KJ013565
Sweet potato leaf curl virus	China	*Sweet potato*	KJ013567
Sweet potato leaf curl virus	Saint Vincent and the Grenadines	*Ipomoea batatas*	KC253238
Sweet potato leaf curl virus	Puerto Rico	*Sweet potato*	DQ644562
Sweet potato leaf curl virus	Puerto Rico	*Sweet potato*	DQ644563
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393456
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393467
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393464
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393465
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393462
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393463
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393461
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393466
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393469

Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393468
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393470
Sweet potato leaf curl virus	China	*Ipomoea batatas*	KF040465
Sweet potato leaf curl virus	Agertina	*Sweet potato*	JQ349087
Sweet potato leaf curl virus	Sudan	*Sweet potato*	KY270782
Sweet potato leaf curl virus	USA	*Ipomoea setosa*	HQ333141
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393442
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393449
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393455
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393445
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393460
Sweet potato leaf curl virus	Sudan	*Sweet potato*	KY270781
Sweet potato leaf curl virus	China	*Sweet potato*	KJ013557
Sweet potato leaf curl virus	USA	*Ipomoea setosa*	HQ333142
Sweet potato leaf curl virus	USA	*Ipomoea batatas*	HQ333139
Sweet potato leaf curl virus	USA	*Ipomoea batatas*	HQ333140
Sweet potato leaf curl virus	China	*Sweet potato*	KJ013582
Sweet potato leaf curl virus	China	*Sweet potato*	KJ013566
Sweet potato leaf curl virus	China	*Sweet potato*	KP069469
Sweet potato leaf curl virus	China	*Sweet potato*	KP069470
Sweet potato leaf curl virus	China	*Sweet potato*	KP069472
Sweet potato leaf curl virus	China	*Sweet potato*	KJ013568
Sweet potato leaf curl virus	China	*Sweet potato*	KJ013569
Sweet potato leaf curl virus	China	*Sweet potato*	KJ013571
Sweet potato leaf curl virus	China	*Sweet potato*	KX033421

Sweet potato leaf curl virus	China	*Sweet potato*	KX033438
Sweet potato leaf curl virus	Japan	*Sweet potato*	AB433788
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992050
Sweet potato leaf curl virus	China	*Sweet potato*	KP069471
Sweet potato leaf curl virus	China	*Sweet potato*	FJ176701
Sweet potato leaf curl virus	China	*Ipomea indica*	JF768740
Sweet potato leaf curl virus	China	*Sweet potato*	KP069467
Sweet potato leaf curl virus	China	*Sweet potato*	KY783941
Sweet potato leaf curl virus	USA	Not specified	AF104036
Sweet potato leaf curl virus	Peru	*Ipomoea batatas*	KC253233
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992059
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992049
Sweet potato leaf curl virus	South Korea	Not specified	HM754641
Sweet potato leaf curl virus	South Korea	Not specified	HM754637
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992053
Sweet potato leaf curl virus	South Korea	Not specified	HM754639
Sweet potato leaf curl virus	South Korea	*Ipomoea batatas*	JX961670
Sweet potato leaf curl virus	South Korea	*Ipomoea batatas*	JX961672
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	FJ969836
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	FJ969835
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	FJ969837
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	FJ969834
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393443
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393446
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393450

Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393451
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992064
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992051
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992067
Sweet potato leaf curl virus	Brazil	*Ipomoea batatas*	HQ393453
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992061
Sweet potato leaf curl virus	South Korea	*Sweet potato*	KT992058
Sweet potato leaf curl virus	China	*Ipomoea batatas*	KT202303
Sweet potato leaf curl virus	China	*Ipomoea batatas*	KP069465
Sweet potato leaf curl virus	China	*Sweet potato*	KX033434
Sweet potato leaf curl virus	China	*Sweet potato*	KX033441
Sweet potato leaf curl virus	China	*Sweet potato*	KX033419
Sweet potato leaf curl virus	China	*Sweet potato*	KX033445
Sweet potato mosaic virus	Brazil	*Ipomoea batatas*	FJ969831
Sweet potato mosaic virus	South Africa	*Ipomoea batatas*	JQ621843
Sweet potato mosaic virus	South Africa	*Ipomoea batatas*	KX859239
Tobacco curly shoot virus	India	*Sida acuta*	LC316184
Tobacco curly shoot virus	Bangladesh	*Solanum lycopersicum*	KM383735
Tobacco curly shoot virus	Bangladesh	*Solanum lycopersicum*	KM383752
Tobacco curly shoot virus	Bangladesh	*Solanum lycopersicum*	KM383753
Tobacco curly shoot virus	India	*Solanum lycopersicum*	JN387045
Tobacco curly shoot virus	India	*Phaseolus vulgaris*	JQ733557
Tobacco curly shoot virus	China	Not specified	AF240675
Tobacco curly shoot virus	China	*Solanum lycopersicum*	KU934094
Tobacco curly shoot virus	Bangladesh	*Solanum lycopersicum*	KM383755

Tobacco curly shoot virus	India	*Solanum lycopersicum*	JX457341
Tobacco curly shoot virus	India	*Solanum lycopersicum*	JX467692
Tobacco curly shoot virus	India	*Solanum lycopersicum*	JX457342
Tobacco curly shoot virus	India	*Solanum lycopersicum*	JX467693
Tobacco curly shoot virus	China	*Solanum lycopersicum*	KX290925
Tobacco curly shoot virus	China	*Citrullus lanatus*	KU198364
Tobacco curly shoot virus	China	*Solanum lycopersicum*	KU934095
Tobacco curly shoot virus	China	*Solanum lycopersicum*	KU934098
Tobacco curly shoot virus	China	*Solanum lycopersicum*	KU934097
Tobacco curly shoot virus	China	*Solanum lycopersicum*	KX290924
Tobacco curly shoot virus	China	Not specified	AJ420318
Tobacco curly shoot virus	China	*Ageratum conyzoides*	AJ971266
Tobacco curly shoot virus	China	*Malvastrum coromandelianum*	MF977704
Tobacco curly shoot virus	China	*Malvastrum coromandelianum*	MF977705
Tobacco curly shoot virus	China	*Pepper*	GU001879
Tobacco curly shoot virus	China	*Mirabilis jalapa Linn.*	GU199584
Tobacco curly shoot virus	Bangladesh	*Solanum lycopersicum L*	KM383756
Tobacco curly shoot virus	China	*Solanum lycopersicum*	AJ457986
Tobacco curly shoot virus	China	*Alternanthera philoxeroides*	GU199583
Tobacco curly shoot virus	China	Not specified	HG003650
Tobacco curly shoot virus	Bangladesh	*Solanum lycopersicum*	KM383757
Tobacco curly shoot virus	Bangladesh	*Solanum lycopersicum*	KM383754
Tobacco curly shoot virus	India	*Sunflower*	HQ407395
Tobacco curly shoot virus	India	*Solanum lycopersicum*	KF551584
Tobacco leaf curl Comoros virus	Comoros	Not specified	AM701762

Tobacco leaf curl Comoros virus	Comoros	Not specified	AM701760
Tobacco leaf curl Cuba virus	Cuba	*Common bean*	KU562963
Tobacco leaf curl Cuba virus	Cuba	*Nicotiana tabacum*	AM050143
Tobacco leaf curl Cuba virus	Cuba	*Phaseolus vulgaris cultivar Quivican*	KX011471
Tobacco leaf curl Japan virus	Japan	*Lonicera japonica*	EF620536
Tobacco leaf curl Japan virus	Japan	Not specified	AB028604
Tobacco leaf curl Japan virus	Japan	*Lycopersicon esculentum*	AB055008
Tobacco leaf curl Pusa virus	India	*Nicotiana tabacum*	HQ180391
Tobacco leaf curl Pusa virus	Bangladesh	*Solanum lycopersicum L.*	KM383734
Tobacco leaf curl virus	China	*Ageratum conyzoides*	AJ971267
Tobacco leaf curl virus	China	Not specified	AF240674
Tobacco leaf curl virus	China	Not specified	AJ512761
Tobacco leaf curl virus	China	Not specified	AJ512762
Tobacco leaf curl virus	China	*Solanum lycopersicum*	AJ566744
Tobacco leaf curl virus	Thailand	*Solanum lycopersicum*	DQ871221
Tobacco leaf curl virus	Thailand	*Capsicum annuum*	KT322140
Tobacco leaf curl Zimbabwe virus	Zimbabwe	Not specified	AF350330
Tobacco leaf curl Zimbabwe virus	Comoros	Not specified	AM701756
Tobacco leaf rugose virus	Cuba	*Nicotiana tabacum*	AJ488768
Tobacco mottle leaf curl virus	Cuba	Not specified	FM160943
Tobacco yellow crinkle virus	Jamaica	*Rhyncosia*	KP641345
Tobacco yellow crinkle virus	Cuba	*Soybean*	KU562964
Tobacco yellow crinkle virus	Cuba	*Nicotiana tabacum*	FJ213931
Tobacco yellow crinkle virus	Cuba	*Capsicum annum*	FJ222587
Tomato bright yellow mosaic virus	Brazil	*Solanum lycorpesicum*	KC791690

Tomato chino La Paz virus	Mexico	*Solanum lycorpesicum plant*	AY339618
Tomato chino La Paz virus	Mexico	*Capsicum annuum L.*	HM459852
Tomato chino La Paz virus	Mexico	*Solanum lycorpesicum plant*	AY339619
Tomato chino La Paz virus	Mexico	*Solanum lycorpesicum plant*	DQ347948
Tomato chino La Paz virus	Mexico	*Solanum lycorpesicum plant*	DQ347949
Tomato chino La Paz virus	Mexico	*Solanum lycorpesicum plant*	JN676150
Tomato chlorotic leaf distortion virus	Venezuela	*Capsicum sp.*	JN241632
Tomato chlorotic leaf distortion virus	Venezuela	*Solanum lycorpesicum*	HQ201952
Tomato chlorotic mottle virus	Brazil	*Solanum lycorpesicum*	AF490004
Tomato chlorotic mottle virus	Brazil	*Solanum lycorpesicum*	DQ336353
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706560
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706551
Tomato chlorotic mottle virus	Brazil	*Solanum lycorpesicum*	AY090557
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706540
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706552
Tomato chlorotic mottle virus	Brazil	*Sida sp.*	KC706544
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706548
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706559
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706556
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706555
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706557
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706553
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706558
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706543
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706549

Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706554
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706547
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706561
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706542
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706550
Tomato chlorotic mottle virus	Brazil	*Sida sp.*	KC706545
Tomato chlorotic mottle virus	Brazil	*Solanum lycopersicum*	KC706546
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KT203558
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706574
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706575
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706583
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706585
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706589
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706581
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706582
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706587
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706580
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706584
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706586
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706588
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706572
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706571
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706578
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706570
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706576

Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706577
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706568
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706573
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706569
Tomato common mosaic virus	Brazil	*Solanum lycopersicum*	KC706579
Tomato common mosaic virus	Brazil	*Solanum lycorpesicum*	EU710754
Tomato curly stunt virus	South Africa	Not specified	AF261885
Tomato dwarf leaf virus	Argentina	*Solanum lycorpesicum*	JN564749
Tomato enation leaf curl virus	India	*Solanum lycopersicum*	KP195260
Tomato golden leaf distortion virus	Brazil	*Lycopersicon esculentum*	HM357456
Tomato golden leaf spot virus	Uruguay	*Solanum lycorpesicum*	KC626021
Tomato golden mottle virus	Mexico	*Solanum lycorpesicum*	AF132852
Tomato golden mottle virus	Mexico	*Lycopersicon sculentum*	DQ520943
Tomato golden mottle virus	Mexico	*Bemisia tabaci*	EF501976
Tomato golden vein virus	Brazil	*Solanum lycopersicum*	JF803256
Tomato golden vein virus	Brazil	*Solanum lycopersicum*	JF803257
Tomato golden vein virus	Brazil	*Solanum lycopersicum*	JF803258
Tomato golden vein virus	Brazil	*Solanum lycopersicum*	JF803255
Tomato golden vein virus	Brazil	*Solanum lycopersicum*	JF803254
Tomato golden vein virus	Brazil	*Solanum lycopersicum*	JF803259
Tomato interveinal chlorosis virus	Brazil	*Solanum lycopersicum*	JF803252
Tomato interveinal chlorosis virus	Brazil	*Solanum lycopersicum*	JF803253
Tomato leaf curl Anjouan virus	Comoros	Not specified	AM701758
Tomato leaf curl Arusha virus	Tanzania	*Solanum lycopersicum*	DQ519575
Tomato leaf curl Arusha virus	Tanzania	*Solanum lycopersicum*	EF194760

Tomato leaf curl Cebu virus	Philippines	*Solanum lycopersicum*	KU946997
Tomato leaf curl Cebu virus	Philippines	*Solanum lycopersicum*	EU487042
Tomato leaf curl Cebu virus	Philippines	*Solanum lycopersicum*	EU487025
Tomato leaf curl Cebu virus	Philippines	*Pepper*	EU487044
Tomato leaf curl Cebu virus	Philippines	*Solanum lycopersicum*	EU487043
Tomato leaf curl China virus	China	*Lycopersicon esculentum*	AJ558119
Tomato leaf curl China virus	China	*Lycopersicon esculentum*	AJ704602
Tomato leaf curl China virus	China	*Solanum lycorpesicum*	KU980917
Tomato leaf curl China virus	China	*Solanum lycorpesicum*	KU980923
Tomato leaf curl China virus	China	*Solanum lycorpesicum*	KU980924
Tomato leaf curl China virus	China	*Lycopersicon esculentum*	AJ558118
Tomato leaf curl China virus	China	*Tobacco*	JF681158
Tomato leaf curl China virus	China	*Solanum lycorpesicum*	KU980918
Tomato leaf curl China virus	China	*Lycopersicon esculentum*	AJ704603
Tomato leaf curl China virus	China	*Solanum lycorpesicum*	KU980916
Tomato leaf curl China virus	China	*Solanum lycorpesicum*	KU980922
Tomato leaf curl China virus	China	*Solanum lycorpesicum*	KU980919
Tomato leaf curl China virus	China	*Solanum lycorpesicum*	KU980921
Tomato leaf curl China virus	China	*Oxalis corniculata*	JX972142
Tomato leaf curl China virus	China	*Solanum lycorpesicum*	KU980920
Tomato leaf curl Diana virus	Madagascar	Not specified	AM701765
Tomato leaf curl Guangdong virus	China	*Lycopersicon esculentum*	AY602165
Tomato leaf curl Guangdong virus	China	*Lycopersicon esculentum*	AY602166
Tomato leaf curl Guangxi virus	China	*Solanum lycorpesicum*	AM236784
Tomato leaf curl Guangxi virus	China	*Solanum lycorpesicum*	AM236785

Tomato leaf curl Guangxi virus	China	*Solanum lycorpesicum*	AM236786
Tomato leaf curl Guangxi virus	China	*Solanum lycorpesicum*	KJ524905
Tomato leaf curl Hainan virus	China	*Lycopersicon esculentum var. cerasiforme*	KF150142
Tomato leaf curl Hainan virus	Vietnam	*Solanum lycorpesicum*	HQ162269
Tomato leaf curl Hainan virus	China	*Solanum lycorpesicum*	FN256261
Tomato leaf curl Hainan virus	Vietnam	*Papaya*	HQ162268
Tomato leaf curl Hanoi virus	Vietnam	*Solanum lycorpesicum*	HQ162270
Tomato leaf curl Kerala virus	India	*Solanum lycopersicum*	EU910141
Tomato leaf curl Kerala virus	India	*Solanum lycopersicum*	KF551575
Tomato leaf curl Kerala virus	India	*Solanum lycopersicum*	EU910140
Tomato leaf curl Kerala virus	Pakistan	*Glycine max*	KX827601
Tomato leaf curl Kerala virus	Pakistan	*Solanum lycopersicum*	LN886521
Tomato leaf curl Kerala virus	Pakistan	*Solanum lycopersicum*	LT556075
Tomato leaf curl Kerala virus	Pakistan	*Brassica rapa*	KX665543
Tomato leaf curl Kerala virus	Pakistan	*Brassica rapa*	KX671963
Tomato leaf curl Kerala virus	Pakistan	*Brassica rapa*	KX665541
Tomato leaf curl Kerala virus	Pakistan	*Brassica rapa*	KX665542
Tomato leaf curl Kerala virus	Pakistan	*Brassica rapa*	KX665540
Tomato leaf curl Kerala virus	Pakistan	*Brassica rapa*	KX671962
Tomato leaf curl Kerala virus	Pakistan	*Glycine max*	KX671564
Tomato leaf curl Laos virus	Laos	*Solanum lycorpesicum*	AF195782
Tomato leaf curl Madagascar virus	Madagascar	*Lycopersicon esculentum*	AJ865338
Tomato leaf curl Madagascar virus	Madagascar	*Lycopersicon esculentum*	AJ865339
Tomato leaf curl Malaysia virus	Malaysia	*Solanum lycorpesicum*	AF327436

Tomato leaf curl Mali virus	Mali	*Solanum lycopersicum*	AY502936
Tomato leaf curl Mali virus	Burkina Faso	*Solanum lycopersicum*	LM651404
Tomato leaf curl Mayotte virus	Mayotte	*Lycopersicon esculentum*	AJ865340
Tomato leaf curl Mindanao virus	Philippines	*Solanum lycorpesicum*	EU487046
Tomato leaf curl Namakely virus	Madagascar	Not specified	AM701764
Tomato leaf curl Namakely virus	Comoros	Not specified	AM701761
Tomato leaf curl Namakely virus	Comoros	*Nicotiana tabacum*	FN600540
Tomato leaf curl Nigeria virus	Nigeria	*Solanum lycopersicum*	FJ685621
Tomato leaf curl Pakistan virus	Pakistan	*Euphorbia pulcherrima*	FM164938
Tomato leaf curl Palampur virus	India	*Solanum melongena L.*	KC501924
Tomato leaf curl Palampur virus	India	*Musk melon*	KY564204
Tomato leaf curl Palampur virus	Iran	*Cucumis melo*	JF501725
Tomato leaf curl Palampur virus	Iran	*Cucurbita pepo*	JF501727
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus*	JF501720
Tomato leaf curl Palampur virus	Iran	*Solanum lycopersicum*	EU547682
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus L.*	FJ660434
Tomato leaf curl Palampur virus	Iran	*Phaseolus vulgaris*	JF501726
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus*	JF501721
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus L.*	FJ660437
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus L.*	FJ660431
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus L.*	FJ660441
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus L.*	FJ660436
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus L.*	JF501723
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus L.*	FJ660439
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus L.*	FJ660438

Tomato leaf curl Palampur virus	Iran	*Citrullus lanatus*	JF501728
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus L.*	FJ660444
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus L.*	FJ660433
Tomato leaf curl Palampur virus	Iran	*Cantaloupe*	EU547683
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus L.*	FJ660432
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus L.*	JF501724
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus L.*	FJ660440
Tomato leaf curl Palampur virus	Iran	*Cucumis melo var Shama*	JF501719
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus L.*	JF501722
Tomato leaf curl Palampur virus	Iran	*Cucumis sativus L.*	JQ825226
Tomato leaf curl Palampur virus	India	Not specified	FJ931537
Tomato leaf curl Palampur virus	India	*Solanum lycopersicum*	KC456161
Tomato leaf curl Palampur virus	Pakistan	*Chili*	KC904968
Tomato leaf curl Palampur virus	India	*Solanum lycorpesicum cv. Trishul*	KF663700
Tomato leaf curl Palampur virus	Pakistan	Not specified	LT556072
Tomato leaf curl Palampur virus	Pakistan	Not specified	LT556077
Tomato leaf curl Palampur virus	Pakistan	Not specified	LT556078
Tomato leaf curl Palampur virus	Pakistan	*Carica papaya*	LN864817
Tomato leaf curl Palampur virus	India	*Cucumber*	KY564205
Tomato leaf curl Palampur virus	India	*Solanum lycopersicum*	AM884015
Tomato leaf curl Palampur virus	India	*Rumex sp.*	HG934859
Tomato leaf curl Palampur virus	India	*Cucumis callosus*	GU253914
Tomato leaf curl Palampur virus	India	*Cucumis melo var. flexuosus*	HQ848383
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	DQ092867
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	EU487027

Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	EU487032
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	EU487029
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	EU487030
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	EU487035
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	EU487038
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	EU487026
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	EU487040
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	KU946996
Tomato leaf curl Philippines virus	Japan	Not specified	AB050597
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	EU487028
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	EU487039
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	EU487037
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	EU487034
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	EU487036
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	KX063715
Tomato leaf curl Philippines virus	Philippines	Not specified	AB377111
Tomato leaf curl Philippines virus	Philippines	Not specified	AB377112
Tomato leaf curl Philippines virus	Philippines	Not specified	AB377113
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	AF136222
Tomato leaf curl Philippines virus	Philippines	Not specified	AB307731
Tomato leaf curl Philippines virus	Philippines	*Solanum lycopersicum*	KU946995
Tomato leaf curl Rajasthan virus	India	Not specified	DQ339117
Tomato leaf curl Seychelles virus	Seychelles	*Solanum lycopersicum*	AM491778
Tomato leaf curl Sulawesi virus	Indonesia	Not specified	FJ237615
Tomato leaf curl Sulawesi virus	Indonesia	*Chili pepper*	FJ237619

Tomato leaf curl Sulawesi virus	Indonesia	*Chili pepper*	FJ237618
Tomato leaf curl Sulawesi virus	Indonesia	*Chili pepper*	FJ237620
Tomato leaf curl Sulawesi virus	Indonesia	*Solanum lycopersicum*	FJ237616
Tomato leaf curl Sulawesi virus	Indonesia	*Solanum lycopersicum*	FJ237614
Tomato leaf curl Sulawesi virus	Indonesia	*Solanum lycopersicum*	FJ237617
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	DQ866128
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723730
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	DQ866123
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723715
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723717
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723722
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723725
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	DQ866130
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723724
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723727
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723728
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723729
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723720
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	DQ866129
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723711
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723726
Tomato leaf curl Taiwan virus	China	*Solanum lycorpesicum*	KJ850342
Tomato leaf curl Taiwan virus	China	*Lycopersicon esculentum*	JQ867094
Tomato leaf curl Taiwan virus	China	*Lycopersicon esculentum*	KC810893
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723710

Tomato leaf curl Taiwan virus	China	*Solanum lycorpesicum*	EU624503
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723713
Tomato leaf curl Taiwan virus	China	*Lycopersicon esculentum*	AM698111
Tomato leaf curl Taiwan virus	China	*Solanum lycorpesicum*	FN256292
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723712
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723716
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723718
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723719
Tomato leaf curl Taiwan virus	China	*Solanum lycorpesicum*	KP195718
Tomato leaf curl Taiwan virus	China	*Lycopersicon esculentum*	JQ867093
Tomato leaf curl Taiwan virus	China	*Solanum lycorpesicum*	KP195720
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723723
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723714
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723708
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723709
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	DQ866125
Tomato leaf curl Taiwan virus	China	*Lycopersicon esculentum*	JX128095
Tomato leaf curl Taiwan virus	China	*Lycopersicon esculentum*	JX128097
Tomato leaf curl Taiwan virus	China	*Lycopersicon esculentum*	JX982137
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	GU723721
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	DQ866127
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	DQ237918
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	DQ866126
Tomato leaf curl Taiwan virus	China	*Solanum lycorpesicum*	KJ850343
Tomato leaf curl Taiwan virus	China	*Solanum lycorpesicum*	KP195719

Tomato leaf curl Taiwan virus	China	*Solanum lycorpesicum*	KF990603
Tomato leaf curl Taiwan virus	China	*Lycopersicon esculentum*	JX128094
Tomato leaf curl Taiwan virus	China	*Lycopersicon esculentum*	JX128098
Tomato leaf curl Taiwan virus	China	*Lycopersicon esculentum*	AM698112
Tomato leaf curl Taiwan virus	China	*Lycopersicon esculentum*	JX128096
Tomato leaf curl Taiwan virus	China	*Lycopersicon esculentum*	KC810891
Tomato leaf curl Taiwan virus	Taiwan	*Solanum lycorpesicum*	DQ866122
Tomato leaf curl Toliara virus	Madagascar	Not specified	AM701768
Tomato leaf curl Uganda virus	Uganda	*Solanum lycopersicum*	DQ127170
Tomato leaf curl Vietnam virus	Vietnam	*Solanum lycorpesicum*	GQ338768
Tomato leaf curl Vietnam virus	Vietnam	*Solanum lycorpesicum*	GQ246941
Tomato leaf curl Vietnam virus	Vietnam	*Solanum lycorpesicum*	GQ338765
Tomato leaf curl Vietnam virus	Vietnam	*Solanum lycorpesicum*	EU368372
Tomato leaf curl Vietnam virus	Vietnam	*Solanum lycorpesicum*	GQ246940
Tomato leaf curl Vietnam virus	Vietnam	*Solanum lycorpesicum*	AF264063
Tomato leaf curl Vietnam virus	Vietnam	*Solanum lycorpesicum*	DQ641705
Tomato leaf curl Vietnam virus	Vietnam	*Solanum lycorpesicum*	GQ338767
Tomato leaf curl Vietnam virus	Vietnam	*Solanum lycopersicum*	EU189149
Tomato leaf curl Vietnam virus	Vietnam	*Lycopersicon esculentum*	KC857511
Tomato leaf curl Vietnam virus	Vietnam	*Ageratum conyzoides*	KC878473
Tomato leaf curl Vietnam virus	Vietnam	*Solanum lycorpesicum*	GQ870288
Tomato leaf curl Vietnam virus	Vietnam	*Solanum lycorpesicum*	GQ338766
Tomato leaf curl virus	Sri Lanka	*Solanum lycopersicum*	AF274349
Tomato leaf curl virus	Indonesia	*Solanum lycopersicum*	AB100304
Tomato leaf curl virus	Indonesia	*Solanum lycopersicum*	AB162141

Tomato leaf curl virus	Iran	Not specified	AY297924
Tomato leaf curl virus	India	*Solanum lycopersicum*	KP178726
Tomato leaf curl virus	India	*Solanum lycopersicum*	KR092195
Tomato leaf curl virus	India	*Solanum lycopersicum*	KF515618
Tomato leaf curl virus	India	*Solanum lycopersicum*	KF515619
Tomato leaf curl virus	India	*Phaseolus vulgaris*	KF440686
Tomato leaf curl virus	India	*Solanum lycopersicum*	AF413671
Tomato leaf curl virus	India	*Solanum lycopersicum*	HM625838
Tomato leaf curl virus	India	*Solanum lycopersicum*	GQ994098
Tomato leaf curl virus	Pakistan	*Solanum lycopersicum*	LN878127
Tomato leaf curl virus	Pakistan	*Solanum lycopersicum*	LN878128
Tomato leaf curl virus	India	*Solanum lycopersicum*	AY190290
Tomato leaf curl virus	India	*Solanum lycopersicum*	KP164862
Tomato leaf curl virus	India	*Solanum lycopersicum*	KP164863
Tomato leaf curl virus	India	Not specified	AF449999
Tomato leaf curl virus	India	*Solanum lycopersicum*	EU573714
Tomato leaf curl virus	Pakistan	*Chili plants*	KY799159
Tomato leaf curl virus	Pakistan	*Gossypium hirsutum*	LN794214
Tomato leaf curl virus	Pakistan	*Gossypium hirsutum*	LN794215
Tomato leaf curl virus	Pakistan	*Solanum lycopersicum*	LN886661
Tomato leaf curl virus	Nepal	Not specified	AY234383
Tomato leaf curl virus	Pakistan	Not specified	FR819708
Tomato leaf curl virus	India	Not specified	AY754814
Tomato leaf curl virus	India	*Solanum lycopersicum*	KP178732
Tomato leaf curl virus	Omam	*Solanum lycopersicum*	HF912280

Tomato leaf curl virus	Omam	*Solanum lycopersicum*	LN680629
Tomato leaf curl virus	Omam	*Solanum lycopersicum*	KF111686
Tomato leaf curl virus	Omam	*Solanum lycopersicum*	KF111684
Tomato leaf curl virus	Omam	*Solanum lycopersicum*	KF111685
Tomato leaf curl virus	Taiwan	*Solanum lycorpesicum*	U88692
Tomato leaf curl virus	India	*Solanum lycopersicum*	KP164859
Tomato leaf curl virus	India	*Solanum lycopersicum*	KF663697
Tomato leaf curl virus	India	*Solanum lycorpesicum*	KF663698
Tomato leaf curl virus	India	*Solanum lycopersicum*	KF551588
Tomato leaf curl virus	India	*Solanum lycopersicum*	GU474418
Tomato leaf curl virus	India	*Solanum lycopersicum*	KP164855
Tomato leaf curl virus	India	*Solanum lycopersicum*	KP164855
Tomato leaf curl virus	India	*Solanum lycopersicum*	KP164861
Tomato leaf curl virus	India	*Solanum lycopersicum*	KP164856
Tomato leaf curl virus	India	Not specified	AF295401
Tomato leaf curl virus	India	*Solanum lycopersicum*	AY456684
Tomato leaf curl virus	India	*Solanum lycopersicum*	DQ852623
Tomato leaf curl virus	India	Not specified	AF165098
Tomato leaf curl virus	India	Not specified	AY428770
Tomato leaf curl virus	India	*Solanum lycopersicum*	KP164860
Tomato leaf curl virus	India	*Solanum lycopersicum*	AF428255
Tomato leaf curl virus	India	*Solanum lycopersicum*	DQ887537
Tomato leaf curl virus	India	*Solanum lycopersicum*	KP164858
Tomato leaf curl virus	India	*Solanum lycopersicum*	KP164857
Tomato leaf curl virus	India	*Solanum lycopersicum*	Z48182

Tomato leaf curl virus	Bangladesh	*Solanum lycopersicum*	KM383758
Tomato leaf curl virus	Bangladesh	*Solanum lycopersicum*	KM383764
Tomato leaf curl virus	Bangladesh	*Solanum lycopersicum*	KM383762
Tomato leaf curl virus	Bangladesh	*Solanum lycopersicum*	KM383765
Tomato leaf curl virus	Bangladesh	*Solanum lycopersicum*	KM383759
Tomato leaf curl virus	Bangladesh	*Solanum lycopersicum*	KM383760
Tomato leaf curl virus	India	*Gaillardia sp.*	JQ765395
Tomato leaf curl virus	Bangladesh	Not specified	AF188481
Tomato leaf curl virus	Bangladesh	*Solanum lycopersicum*	KM383763
Tomato leaf curl Yunnan virus	China	*Solanum lycorpesicum*	HF674921
Tomato leaf curl Yunnan virus	China	*Solanum lycorpesicum*	HF674920
Tomato leaf deformation virus	Peru	*Solanum lycorpesicum*	JX501508
Tomato leaf deformation virus	Peru	*Solanum lycorpesicum*	JX501503
Tomato leaf deformation virus	Peru	*Solanum lycorpesicum*	JX501509
Tomato leaf deformation virus	Peru	*Solanum lycorpesicum*	JX501507
Tomato leaf deformation virus	Peru	*Solanum lycorpesicum*	JX501502
Tomato leaf deformation virus	Equador	*Solanum lycorpesicum*	JX501510
Tomato leaf deformation virus	Peru	*Solanum lycopersicum*	GQ334472
Tomato leaf deformation virus	Chile	*Solanum lycorpesicum*	KC620462
Tomato leaf deformation virus	Chile	*Solanum lycorpesicum*	KC620461
Tomato leaf deformation virus	Peru	*Solanum lycorpesicum*	JX501504
Tomato leaf deformation virus	Peru	*Solanum lycorpesicum*	JX501506
Tomato leaf deformation virus	Peru	*Solanum lycorpesicum*	JX501505
Tomato leaf distortion virus	Brazil	*Solanum lycopersicum*	KC706605
Tomato leaf distortion virus	Brazil	*Solanum lycorpesicum*	EU710749

Tomato mild mosaic virus	Brazil	*Sida urens*	JX871374
Tomato mild mosaic virus	Brazil	*Sida urens*	JX871375
Tomato mild mosaic virus	Brazil	*Sida urens*	KC706608
Tomato mild mosaic virus	Brazil	*Solanum lycopersicum*	KC706610
Tomato mild mosaic virus	Brazil	*Solanum lycopersicum*	KC706611
Tomato mild mosaic virus	Brazil	*Solanum lycorpesicum*	EU710752
Tomato mild mosaic virus	Brazil	*Sida urens*	KC706606
Tomato mild mosaic virus	Brazil	*Sida urens*	KC706607
Tomato mild yellow leaf curl Aragua virus	Venezuela	*Solanum lycopersicum*	KY353797
Tomato mild yellow leaf curl Aragua virus	Venezuela	*Lycopersicon esculentum cv.*	AY927277
Tomato mosaic Havana virus	Havana	Not specified	Y14874
Tomato mosaic Havana virus	Nicaragua	Not specified	EF088197
Tomato mosaic Havana virus	Guatemala	*Unidentified plant*	KT099130
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	JF803247
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	JF803246
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	JF803249
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	JF803248
Tomato mottle leaf curl virus	Brazil	*Solanum lycorpesicum*	KY196218
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896410
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896399
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896411
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896403
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896404
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896405
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896400

Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896407
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896402
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896398
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896406
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896401
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896408
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896409
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	JF803250
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KC706616
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KC706615
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	JF803251
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896413
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896414
Tomato mottle leaf curl virus	Brazil	*Solanum lycopersicum*	KX896412
Tomato mottle wrinkle virus	Argentina	*Bean*	KY555800
Tomato mottle wrinkle virus	Argentina	*Solanum lycorpesicum*	KM243019
Tomato mottle wrinkle virus	Argentina	*Solanum lycorpesicum*	KM243018
Tomato mottle wrinkle virus	Argentina	*Solanum lycorpesicum*	KM243020
Tomato mottle wrinkle virus	Argentina	*Solanum lycorpesicum*	JQ714137
Tomato rugose mosaic virus	Brazil	*Solanum lycorpesicum*	AF291705
Tomato severe leaf curl virus	Mexico	*Solanum lycorpesicum plant*	JN676151
Tomato severe leaf curl virus	Guatemala	*Solanum lycorpesicum plant*	AF130415
Tomato severe leaf curl virus	Guatemala	*Unidentified plant*	KT099119
Tomato severe leaf curl virus	Mexico	*Solanum lycorpesicum plant*	DQ347946
Tomato severe leaf curl virus	Mexico	*Solanum lycorpesicum plant*	DQ347947

Tomato severe leaf curl virus	Guatemala	*Unidentified plant*	KT099129
Tomato severe leaf curl virus	Mexico	*Solanum lycorpesicum*	JN680352
Tomato severe leaf curl virus	Nicaragua	*Lycopersicon esculentum*	AJ508784
Tomato severe leaf curl virus	Nicaragua	*Lycopersicon esculentum*	AJ508785
Tomato severe leaf curl virus	India	*Solanum lycopersicum*	KP195267
Tomato severe rugose virus	Brazil	*Solanum lycorpesicum*	AY029750
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004072
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004073
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004074
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004070
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004071
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865633
Tomato severe rugose virus	Brazil	*Phaseolus vulgaris cv.*	KX458238
Tomato severe rugose virus	Brazil	*Solanum betaceum*	KY524458
Tomato severe rugose virus	Brazil	*Soybean*	KX828624
Tomato severe rugose virus	Brasil	*Eggplant cultivar Napoli*	KY781196
Tomato severe rugose virus	Brazil	*Nicandra physaloides*	EU086591
Tomato severe rugose virus	Brazil	*Solanum lycorpesicum*	HQ606467
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC706619
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JF803263
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JF803262
Tomato severe rugose virus	Brazil	*Capsicum annuum*	FJ824808
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JF803260
Tomato severe rugose virus	Brazil	*Nicandra physaloides*	JX415197
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX415198

Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX415199
Tomato severe rugose virus	Brazil	*Nicandra physaloides*	JX415188
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX415201
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX415193
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX415202
Tomato severe rugose virus	Brazil	*Crotalaria juncea*	JX415190
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX415196
Tomato severe rugose virus	Brazil	*Chili pepper*	DQ207749
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JF803261
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865639
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865622
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865643
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865644
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865645
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865650
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865637
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865624
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865631
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865632
Tomato severe rugose virus	Brazil	*Sida sp.*	KC004090
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865623
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865642
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865635
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865628
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865648

Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865649
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865619
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865630
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865636
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865627
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865641
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004068
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865638
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865647
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004069
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865616
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865617
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865618
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865634
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865626
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865615
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865625
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865629
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865640
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865646
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865620
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	JX865621
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004089
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004088
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004078

Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004079
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004077
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004081
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC706618
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC706617
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004086
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004083
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004085
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004087
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004084
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004076
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC706620
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004075
Tomato severe rugose virus	Brazil	*Solanum lycopersicum*	KC004080
Tomato severe rugose virus	Brazil	*Sida sp.*	KC004082
Tomato yellow leaf curl China virus	China	*Solanum lycopersicum*	KU934104
Tomato yellow leaf curl China virus	China	*Malvastrum coromandelianum*	AJ971524
Tomato yellow leaf curl China virus	China	*Malvastrum coromandelianum*	AJ971265
Tomato yellow leaf curl China virus	China	*Malvastrum coromandelianum*	JN082233
Tomato yellow leaf curl China virus	China	*Malvastrum coromandelianum*	JN082237
Tomato yellow leaf curl China virus	China	*Malvastrum coromandelianum*	KC189894
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	AJ319676
Tomato yellow leaf curl China virus	China	*Tobacco*	AM261326
Tomato yellow leaf curl China virus	China	*Malvastrum coromandelianum*	AM980509
Tomato yellow leaf curl China virus	China	*Mallow*	KU934105

Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	KU934102
Tomato yellow leaf curl China virus	China	*Malvastrum coromandelianum*	KC189893
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	AJ319675
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	FN985163
Tomato yellow leaf curl China virus	China	*Tobacco*	AM260703
Tomato yellow leaf curl China virus	China	*Malva parviflora*	JX679252
Tomato yellow leaf curl China virus	China	*Tobacco*	KF640689
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	AJ457985
Tomato yellow leaf curl China virus	China	*Malva parviflora*	JX679251
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	KU990875
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	KU934101
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	KU934103
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	KU934106
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	KU934099
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	KU934100
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	AJ457823
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	AM260702
Tomato yellow leaf curl China virus	China	*Solanum aculeatissimum*	AM181683
Tomato yellow leaf curl China virus	China	*Tobacco*	AM260701
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	AJ420316
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	AJ420317
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	AJ319677
Tomato yellow leaf curl China virus	China	*Panax notoginseng*	KJ477327
Tomato yellow leaf curl China virus	China	*Nicotiana tabacum*	AM050555
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	AF311734

Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	KU980915
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	KU980913
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	KU980914
Tomato yellow leaf curl China virus	China	*Phaseolus vulgaris L.*	DQ256460
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	GU199588
Tomato yellow leaf curl China virus	China	*Datura stramonium Linn*	EF011559
Tomato yellow leaf curl China virus	China	*Artemisia carvifolia Buch*	EU365686
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	AJ319674
Tomato yellow leaf curl China virus	China	*Solanum lycorpesicum*	AJ781302
Tomato yellow leaf curl Indonesia virus	Indonesia	*Solanum lycopersicum*	AF189018
Tomato yellow leaf curl Kanchanaburi virus	Cambodia	*Solanum lycopersicum*	KR073094
Tomato yellow leaf curl Kanchanaburi virus	Vietnam	*Solanum melongena*	KU569608
Tomato yellow leaf curl Kanchanaburi virus	Cambodia	*Solanum lycopersicum*	KR073093
Tomato yellow leaf curl Kanchanaburi virus	Cambodia	*Solanum melongena*	KR073086
Tomato yellow leaf curl Kanchanaburi virus	Cambodia	*Solanum melongena*	KR073087
Tomato yellow leaf curl Kanchanaburi virus	Vietnam	*Solanum lycopersicum*	DQ169054
Tomato yellow leaf curl Kanchanaburi virus	Vietnam	*Solanum melongena*	DQ641702
Tomato yellow leaf curl Kanchanaburi virus	Thailand	*Solanum melongena*	KU569592
Tomato yellow leaf curl Kanchanaburi virus	Thailand	*Solanum melongena*	KU569600
Tomato yellow leaf curl Kanchanaburi virus	Thailand	*Solanum melongena*	KU569588
Tomato yellow leaf curl Kanchanaburi virus	Thailand	*Solanum melongena*	KU569590
Tomato yellow leaf curl Kanchanaburi virus	Thailand	*Solanum melongena*	KU569584
Tomato yellow leaf curl Kanchanaburi virus	Thailand	*Solanum melongena*	KU569594
Tomato yellow leaf curl Kanchanaburi virus	Thailand	*Solanum melongena*	KU569596
Tomato yellow leaf curl Kanchanaburi virus	Laos	*Solanum melongena*	KF218820

Tomato yellow leaf curl Kanchanaburi virus	Thailand	*Solanum melongena*	KU569603
Tomato yellow leaf curl Kanchanaburi virus	Vietnam	*Solanum melongena*	KU569606
Tomato yellow leaf curl Kanchanaburi virus	Laos	*Solanum melongena*	KU569604
Tomato yellow leaf curl Kanchanaburi virus	Indonesia	*Capsicum annuum*	LC051116
Tomato yellow leaf curl Kanchanaburi virus	Indonesia	*Chili pepper*	KF446669
Tomato yellow leaf curl Kanchanaburi virus	Indonesia	*Chili pepper*	KF446675
Tomato yellow leaf curl Kanchanaburi virus	Indonesia	*Solanum melongena*	KF446663
Tomato yellow leaf curl Kanchanaburi virus	Indonesia	*Solanum melongena*	KF446661
Tomato yellow leaf curl Kanchanaburi virus	Indonesia	*Chili pepper*	KF446671
Tomato yellow leaf curl Kanchanaburi virus	Indonesia	*Chili pepper*	KF446673
Tomato yellow leaf curl Kanchanaburi virus	Indonesia	*Solanum melongena*	KF446667
Tomato yellow leaf curl Kanchanaburi virus	Indonesia	*Solanum melongena*	KF446665
Tomato yellow leaf curl Kanchanaburi virus	Thailand	Not specified	AF511529
Tomato yellow leaf curl Kanchanaburi virus	Thailand	Not specified	AF511530
Tomato yellow leaf curl Malaga virus	Portugal	*Solanum lycopersicum*	JN859135
Tomato yellow leaf curl Malaga virus	Portugal	*Solanum lycopersicum*	JN859137
Tomato yellow leaf curl Malaga virus	Marroco	*Phaseolus vulgaris*	LN846611
Tomato yellow leaf curl Malaga virus	Marroco	*Phaseolus vulgaris*	LN846612
Tomato yellow leaf curl Malaga virus	Spain	Not specified	AF271234
Tomato yellow leaf curl Mali virus	Ethiopia	*Solanum lycopersicum*	DQ358913
Tomato yellow leaf curl Mali virus	Cameroon	*Capsicum annum*	FM212660
Tomato yellow leaf curl Mali virus	Cameroon	*Capsicum annum*	FM212661
Tomato yellow leaf curl Mali virus	Cameroon	*Solanum lycopersicum*	FM212662
Tomato yellow leaf curl Mali virus	Cameroon	*Solanum lycopersicum*	FM212663
Tomato yellow leaf curl Mali virus	Mali	*Solanum lycopersicum*	AY502934

Tomato yellow leaf curl Mali virus	Burkina Faso	*Solanum lycopersicum*	LM651400
Tomato yellow leaf curl Mali virus	Burkina Faso	*Solanum lycopersicum*	LM651401
Tomato yellow leaf curl Mali virus	Ghana	*Solanum lycopersicum*	EU847740
Tomato yellow leaf curl Mali virus	Burkina Faso	*Solanum lycopersicum*	LM651402
Tomato yellow leaf curl Mali virus	Burkina Faso	*Solanum lycopersicum*	LM651403
Tomato yellow leaf curl Mali virus	Burkina Faso	*Solanum lycopersicum*	KX853168
Tomato yellow leaf curl Oman virus	Oman	*Ocimum basilicum*	HG941642
Tomato yellow leaf curl Oman virus	Oman	*Solanum lycopersicum*	HG941650
Tomato yellow leaf curl Oman virus	Oman	*Solanum lycopersicum*	HG941651
Tomato yellow leaf curl Oman virus	Oman	*Tabacco*	HG941646
Tomato yellow leaf curl Oman virus	Oman	*Solanum lycopersicum*	HG941649
Tomato yellow leaf curl Oman virus	Oman	*Tabacco*	HG941645
Tomato yellow leaf curl Oman virus	Oman	*Tabacco*	HG941647
Tomato yellow leaf curl Oman virus	Oman	*Squash*	HG941640
Tomato yellow leaf curl Sardinia virus	Israel	Not specified	DQ845787
Tomato yellow leaf curl Sardinia virus	Tunisia	Not specified	AY736854
Tomato yellow leaf curl Sardinia virus	Sicily	Not specified	Z28390
Tomato yellow leaf curl Sardinia virus	Italy	*Solanum lycopersicum cv. Schieren*	GU951759
Tomato yellow leaf curl Sardinia virus	Jordan	*Sinapis arvensis*	JX131285
Tomato yellow leaf curl Sardinia virus	Not specified	Not specified	X61153
Tomato yellow leaf curl Sardinia virus	Spain	*Solanum lycopersicum*	KC953604
Tomato yellow leaf curl Sardinia virus	Marocco	*Solanum lycopersicum*	LN846595
Tomato yellow leaf curl Sardinia virus	Marocco	Not specified	LN846596
Tomato yellow leaf curl Sardinia virus	Marocco	*Solanum nigrum*	LN846597
Tomato yellow leaf curl Sardinia virus	Portugal	*Solanum lycopersicum*	JN859134

Tomato yellow leaf curl Sardinia virus	Portugal	*Solanum lycopersicum*	JN859136
Tomato yellow leaf curl Sardinia virus	Marocco	Not specified	AY702650
Tomato yellow leaf curl Sardinia virus	Marocco	*Solanum lycopersicum*	LN846598
Tomato yellow leaf curl Sardinia virus	Spain	Not specified	L27708
Tomato yellow leaf curl Sardinia virus	Spain	Capsicum annuum	KC953603
Tomato yellow leaf curl Sardinia virus	Spain	Not specified	Z25751
Tomato yellow leaf curl Sardinia virus	Spain	Capsicum annuum	KC953603
Tomato yellow leaf curl Sardinia virus	Spain	Not specified	Z25751
Tomato yellow leaf curl Sardinia virus	Spain	*Solanum lycopersicum*	AJ519675
Tomato yellow leaf curl Thailand virus	Thailand	*Solanum lycopersicum*	KT322144
Tomato yellow leaf curl Thailand virus	China	*Lycopersicon esculentum*	AJ495812
Tomato yellow leaf curl Thailand virus	Thailand	*Not specified*	AY514632
Tomato yellow leaf curl Thailand virus	Myanmar	*Solanum lycorpesicum*	AF206674
Tomato yellow leaf curl Thailand virus	China	*Solanum lycorpesicum*	KX290922
Tomato yellow leaf curl Thailand virus	China	*Nicandra physalodes*	MF040760
Tomato yellow leaf curl Thailand virus	Thailand	*Not specified*	AF141922
Tomato yellow leaf curl Thailand virus	Thailand	*Not specified*	X63015
Tomato yellow leaf curl Thailand virus	Thailand	*Bemisia tabaci*	KX943292
Tomato yellow leaf curl Thailand virus	Thailand	*Solanum lycopersicum*	KX943294
Tomato yellow leaf curl Thailand virus	Thailand	*Not specified*	AY514631
Tomato yellow leaf curl Thailand virus	Taiwan	*Pepper*	GU208516
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723735
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	EF577264
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723749
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723750

Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723738
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723748
Tomato yellow leaf curl Thailand virus	Taiwan	*Pepper*	GU208515
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723739
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723733
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723732
Tomato yellow leaf curl Thailand virus	Taiwan	*Capsicum annuum (pepper)*	EU249457
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723737
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723734
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	EF577266
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723743
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723746
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723745
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723747
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723744
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723740
Tomato yellow leaf curl Thailand virus	Taiwan	*Pepper*	GU208518
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723742
Tomato yellow leaf curl Thailand virus	Taiwan	*Pepper*	GU208517
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723731
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723736
Tomato yellow leaf curl Thailand virus	Taiwan	*Solanum lycorpesicum*	GU723741
Tomato yellow leaf curl Thailand virus	Thailand	*Solanum lycorpesicum*	AY514630
Tomato yellow leaf curl Thailand virus	Thailand	*Solanum lycorpesicum*	DQ871222
Tomato yellow leaf curl Yunnan virus	China	*Amaranthus blitum*	KU933256

Tomato yellow leaf curl Yunnan virus	China	*Solanum lycopersicum*	KC686706
Tomato yellow leaf curl Yunnan virus	China	*Solanum lycopersicum*	KC686705
Tomato yellow leaf curl Yunnan virus	China	*Solanum lycopersicum*	KC686707
Tomato yellow leaf curl Yunnan virus	China	*Solanum lycopersicum*	KC686708
Tomato yellow leaf curl Yunnan virus	China	*Solanum lycopersicum*	KC686709
Tomato yellow leaf curl Yunnan virus	China	*Solanum lycopersicum*	KC686710
Tomato yellow leaf curl Yunnan virus	China	*Amaranthus blitum*	KU933255
Tomato yellow leaf curl Yunnan virus	China	*Solanum lycorpesicum*	KU975400
Tomato yellow margin leaf curl virus	Venezuela	*Solanum lycorpesicum*	AY508993
Tomato yellow mottle virus	Costa Rica	*Solanum lycopersicum*	KC176780
Tomato yellow mottle virus	Costa Rica	*Solanum lycorpesicum*	KY064009
Tomato yellow mottle virus	Costa Rica	*Solanum lycorpesicum*	KY064010
Tomato yellow mottle virus	Costa Rica	*Solanum lycorpesicum*	KY064015
Tomato yellow spot virus	Argentina	*Bean*	FJ538207
Tomato yellow spot virus	Argentina	*Salvia hispanica*	KJ742419
Tomato yellow spot virus	Brazil	*Leonurus sibiricus*	JX513952
Tomato yellow spot virus	Brazil	*Leonurus sibiricus*	KX348179
Tomato yellow spot virus	Brazil	*Leonurus sibiricus*	KX348167
Tomato yellow spot virus	Brazil	*Leonurus sibiricus*	KX348168
Tomato yellow spot virus	Brazil	*Solanum lycorpesicum*	DQ336350
Tomato yellow spot virus	Brazil	*Solanum lycopersicum*	KC706628
Tomato yellow spot virus	Brazil	*Leonurus sibiricus*	KX348172
Tomato yellow spot virus	Brazil	*Leonurus sibiricus*	KX348175
Tomato yellow spot virus	Brazil	*Leonurus sibiricus*	KX348176
Tomato yellow spot virus	Brazil	*Leonurus sibiricus*	KX348178

Tomato yellow spot virus	Brazil	*Leonurus sibiricus*	KX348169
Tomato yellow spot virus	Brazil	*Leonurus sibiricus*	KX348171
Tomato yellow spot virus	Brazil	*Leonurus sibiricus*	KX348173
Tomato yellow spot virus	Brazil	*Leonurus sibiricus*	KX348166
Tomato yellow spot virus	Brazil	*Leonurus sibiricus*	KX348170
Tomato yellow spot virus	Brazil	*Leonurus sibiricus*	KX348174
Tomato yellow spot virus	Brazil	*Leonurus sibiricus*	KX348177
Tomato yellow spot virus	Brazil	*Leonurus sibiricus*	KX348165
Tomato yellow vein streak virus	Brazil	*Solanum lycorpesicum*	EF459696
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706642
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706645
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706634
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706637
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706641
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706633
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706629
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706638
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706636
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706635
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706644
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706632
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706651
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706650
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706649
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706654

Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706648
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706647
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706652
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706640
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706639
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706646
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706643
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706653
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706631
Tomato yellow vein streak virus	Brazil	*Solanum lycopersicum*	KC706630
Tomato yellow vein streak virus	Uruguay	*Solanum lycopersicum*	KR024026
Tomato yellow vein streak virus	Argentina	*Solanum lycorpesicum*	KJ413253
Tomato yellow vein streak virus	Argentina	*Bean*	KY555801
Tomato yellow vein streak virus	Argentina	*Solanum lycorpesicum cv. Elpida*	GQ387369
Tomato yellow vein streak virus	Brazil	*Potato*	EF417915
Tomato yellow vein streak virus	Chile	*Solanum lycorpesicum*	KC136339
Tomato yellow vein streak virus	Chile	*Solanum lycorpesicum*	KC136337
Tomato yellow vein streak virus	Chile	*Solanum lycorpesicum*	KC136336
Velvet bean golden mosaic virus	Taiwan	*Velvet bean*	KU569583
Velvet bean golden mosaic virus	Taiwan	*Velvet bean*	KU569578
Velvet bean golden mosaic virus	Taiwan	*Velvet bean*	KU569580
Velvet bean golden mosaic virus	Taiwan	*Velvet bean*	KU569581
Velvet bean golden mosaic virus	Taiwan	*Velvet bean*	KU569582
Velvet bean golden mosaic virus	Taiwan	*Velvet bean*	KU569579
Velvet bean severe mosaic	India	*Macuna spp.*	FN543425

Vernonia crinkle virus	Uganda	*Vernonia amygdalina*	KX831132
Vernonia crinkle virus	Uganda	*Vernonia amygdalina*	KX831133
Vernonia yellow vein Fujian virus	China	*Vernonia cinerea*	JF265670
Vernonia yellow vein virus	India	*Vernonia cinerea*	AM182232
Vigna yellow mosaic virus	Mexico	*Vigna elegans*	KC430936
Vinca leaf curl virus	India	*Vinca rosea*	KR612272
Wissadula golden mosaic St Thomas Virus	Jamaica	*Wissadula amplissima*	DQ395343
Wissadula golden mosaic St Thomas Virus	Jamaica	*Wissadula amplissima*	GQ355488
Wissadula yellow mosaic virus	Brazil	*Sida sp.*	KX691409
Wissadula yellow mosaic virus	Brazil	*Wissadula sp.*	KX691411