Table S1. The list of viroid published by the International Committee on Taxonomy of Viruses (ICTV) and a brief description of the characteristics of the members of *Avsunviroidae* and *Pospiviroidae*. The table lists only the species that has NCBI Genebank accessions. * - Possible members, TS – Type species, RNP – Ribo-nucleoprotein.

Genus	**Viroid**	**Genome size (bp)**	**Remarks**	**Ref**
Family -*Avsunviroidae*				
Avsunviroid	Avocado Sun Blotch Viroid (ASBvd)[TS]	247	Avocado is the primary host. Causes symptoms on fruits like sunken crevices of white, yellow, or reddish color, and can be necrotic in severe infection	[1]
Pelamoviroid	Chrysanthemum chlorotic mottle viroid (CCMvd)	399	Only found in Chrysanthemum. It Causes Yellow-green mottling, chlorosis, and dwarfed size in infected plants.	[2]
	Peach latent mosaic viroid (PLMvd)[TS] – peach, calico	337, 349	Can infect wide range of temperate fruits. May be symptomless or causes yellow, chlorotic mosaics and delays in foliation, flowering, and ripening, with fruit deformation and discoloration	[3]
Elaviroid	Eggplant latent viroid (ELvd)[TS]	335	Only infects eggplants and are symptomless. The viroid has been widely used as model system for molecular studies and recombinant protein expression.	[4]
Family *Pospiviroidae*				
Pospiviroid	Chrysanthemum stunt viroid (CSVd)	356	Wide host range including Asteraceae and Solanaceae. Cause light green young leaves, chlorotic spots, stunting, small leaves and flowers, and decreased rooting ability	[2]
	Citrus exocortis viroid – citrus, tomato (CEVd – cit, CEVd – tom)	371, 372	Infects tomatoes, citrus and some ornamental plants. In tomatoes, it causes severe effects by imposing ribosomal stress. In citrus, it shows leaf epinasty, stunting, and necrosis of the leaf midvein.	[5], [6]
	Columnea latent viroid(CLVd)	370	Limited host range with an asymptomatic infection in some ornamental plants but necrosis on leaf veins, plant stunting and yield reduction found in Solanaceae species. Asteraceae species and cucumber are among other hosts. The terminal right domain of the virus genome is the 'host adaptation region'.	[7], [8]
	Iresine viroid 1 ((IrVd-1-ire)	370	It is asymptomatic. Found only in some ornamental plants.	[9]
	Mexican papita viroid (MPVd)	360	It causes serious disease outbreaks on greenhouse tomato in North America. First isolated from *Solanum cardiophyllum* (Mexican papita), causes symptoms of epinasty, stunning and veinal necrosis.	[10]

	Potato spindle tuber viroid (PSTVd)[TS] – potato, intermediate, tomato	348, 356, 359	It is type member of the *Popsiviridae.* Infects several members of *Solanaceae,* and few others like avocado and sweet potato. It causes leaf curling, stunted growth, epinasty and venial necrosis. It is a well-studied viroid, known to silence various genes in the host like, *StTCP23*, *CalS11-like, CalS12-like,* chloride channel protein *CLC-b-like, RPS3a-like mRNA* etc.	[11], [12], [13], [14]
	Tomato apical stunt viroid – tomato (TASVd)	360	One of the most prevalent *Popsiviridae,* in ornamental plants in Netherlands. Mostly infects members of Compositae and Solanaceae families. Causative agent for the 'Rasta Disease' in tomato, symptomized by stunting; epinasty, crumpling, and chlorosis of leaves; and necrosis of leaf veins, petioles, and stems.	[15], [16], [17]
	Tomato chlorotic dwarf viroid (TCDVd)	360	Tomato is the primary host, also infects other plants, mostly asymptomatic. An infected tomato plant shows chlorosis of leaves and dwarfing.	[18]
	Tomato planta macho viroid – tomato (TPMVd)	360	TPMVd leads to severe stunting, strong epinasty in leaves, and decreased fruit in tomato plants. One of the viroids that can be horizontally transferred from pollen to the mother plant. Terminal left (TL) domain is the determinant for the phenomenon.	[19],
Hostuviroid	Hop stunt viroid (HSV)[TS] – hop, citrus, cucumber, peach, plum	297, 299, 303, 297, 297	Infects a wide range of woody plants like grapevine, citrus, plum, peach, fig, mulberry, pear, pistachio and almond. HSvd translocate in the host plant as an RNP complex with host phloem protein 2 in cucumber (CsPP2).	[20], [21]
Cocadviroid	Citrus bark cracking viroid - citrus (Citrus viroid IV)	284	It infects mainly citrus and citrus relatives, and other herbaceous plants like herbaceous hosts such as cucumber, tomato, eggplant, datura, chrysanthemum, and gynura. It is a major pathogen in hops, causing a huge decline in the yield. Symptoms in hops include plant stunting, leaf yellowing and down curling, small cone formation and dry root rot.	[22], [23]
	Coconut cadang-cadang viroid (CCCVd)[TS] - coconut palm, oil palm	246, 297	It is a lethal disease characterized by orange spotting symptoms in palm trees. The disease known to progress in three different stages. The overall time of appearance of the first symptoms to death of the plant is from 8-16 years.	[24], [25]
	Coconut tinangaja viroid (CTiVd) - coconut palm	254	It has 64% sequence identity with the CCCVd and they differ only in symptomatology. The disease has been reported only in Guam.	[26]
	Hop latent viroid (HpLVd) – hop	256	Majorly infect hop cultivar also can infect other species like peach, grapevine and citrus. It occurs mostly as mixed infections with other pathogens like with *carlaviruses, Apple mosaic*	[27]

			virus, and *HSVd.* It is als0 found in mixed infection with various fungus species.	
Apscaviroid	Apple dimple fruit viroid (ADFVd)- apple	306	Infects apple cultivars like 'Royal Gala', 'Golden Delicious', 'Annurca' and 'Red Delicious', with typical dimpling symptoms (small, a few millimeters in diameter, slightly depressed yellow–green spots scattered on the whole fruit surface and around the calyx). Other symptoms show dappling, crinkling and irregular yellow spots on their fruits.	[28], [29]
	Apple scar skin viroid (ASSVd)^{TS} – apple, dapple apple	329, 331	It causes serious pome fruit diseases such as apple scar skin, dapple apple, pear rusty skin, pear fruit crinkle, and pear dimple fruit.	[30]
	Australian grapevine viroid (AGVd) - grapevine	369	First reported from Australia in 1990. The viroid is reported to be recombinant of many other viroids like citrus exocortis, potato spindle tuber, apple scar skin, and grapevine yellow speckle viroids.	[31]
	Citrus bent leaf viroid (CBLVd) - citrus (Citrus viroid I)	318	Viroid mainly infecting citrus is characterized by bark necrosis and decline. The citrus viroid I (CVd-I) is subgrouped into CVd-Ia and CVd-Ib. CBLVd is the CVd-Ib. The CVd-Ia is known to be derived from the CVd-Ib by the duplication of 5nt in the right terminal region.	[32], [33]
	Citrus dwarfing viroid (CDVd) - IIIa (Citrus viroid IIIa), IIIb (Citrus viroid IIIb)	297,294	Naturally found in citrus and citrus related species. The CDVd has been used to control tree size for the high-density citrus cultivation. The viroid has been reported to be co-infected with other viruses and viroids. CDVd uses the RNA silencing by Citrus tristeza virus (CTV) to accumulate the viroid. Also, new variants of the viroids arising from the point mutations and RNA recombination has also been reported.	[34], [35], [36]
	Citrus viroid V (CVd V) – citrus	294	Naturally infects citrus and citrus related species. Show very small, necrotic, gum-filled lesions on stems. Has shown synergistic interaction with other citrus viroids, so used successfully to identify pathogenic determinant of viroids.	[37], [38]
	Citrus viroid VI - citrus (Citrus viroid-original source, CVdVI-os)	330	First isolated from citrus and persimmon in Japan. Induce symptoms like petiole necrosis and mild leaf bending, and cause less harm when singly infected but in case of the mixed infection with other citrus viruses the loss can be severe.	[39, 40]
	Grapevine yellow speckle viroid (GYSVd-)1, 2 - grapevine	367, 363	Induces the symptoms of small, yellow flecks, scattered over the leaf surface.	[41, 42]

	Pear blister canker viroid – pear (PBCVd)	315	Most pears infected with PBCVd are symptomless, whereas susceptible indicator strains show necrosis on the bark after 3-4 months of infection and dies in 6 months. The viroid RNA is known to be recombinant formed by the segmental exchange of viroid RNAs from same group or other closely related groups.	[43], [44], [45]
	Apple fruit crinkle viroid (AFCVd)*****	371	The viroid RNA majorly infects apples and hop cultivars, also found to be experimentally infectious to tomatoes and cucumbers. Symptoms in apple are crinkling and dappling of mature fruit surface, and the severity of crinkling varies among the commercial apple cultivars. These viroids carry host dependent mutations and the stem loop structure in the left half region is important for the replication.	[46], [47], [48]
Coleviroid	Coleus blumei viroid (CBVd)^{TS} 1, 2, 3 - coleus	248, 301,361	CBVd infection primarily affects leaf color of Coleus, the ornamental plant. It shows chlorosis or a purple pigmentation in some varieties of the Coleus plants. The most common way of the transmission of the viroid is by seed transmission, which can be affected by a single nucleotide substitution at the position 25.	[49], [50]

Table S2. The list of linear and circular satRNAs, and a brief description of the relationship of satRNAs with helper virus and the plant host. * - Possible members, satRNA – Satellite RNA, DI-RNA – Defective Interfering RNA, CP-ORF – Coat protein-open reading frame.

	Linear Sat-RNA			
Associated Family or Genus	**Satellite RNA**	**Genome Size**	**Remarks**	**Ref**
Tombusviridae	Black beet scorch virus (BBSV) satellite RNA	615	The satRNA enhance the pathogenesis and the accumulation of BBSV by alleviating antiviral RNA silencing. The sat-RNA genome is found in multimeric forms, which are used as templates for the replication.	[51-53]
	Cymbidium ringspot virus (CymRSV) satellite RNA	618	The satRNA is parasitic to the helper virus, and replication and accumulation require transacting factors provided by the helper virus and the host. It is known to suppress the accumulation of the CymRSV DI-RNA.	[54-56]
	Panicum mosaic virus (PMV) satellite RNA	826	The satellite PMV elevates the infection by the helper virus by increasing the virus titer. The relationship is determined by two amino acid residues in the CP ORF of PMV.	[57-59]
	Tobacco necrosis virus (TNV) small satellite RNA	629	The satRNA has been patented for the development of the probe for detection of the TNV (PN - JP 1991191784-A/8)	N/A
	Tomato bushy stunt virus (TBSV) satellite RNA	612 (B10), 615 (B1), 822 (Sat-L)	The satRNA B10 significantly reduces the pathogenesis by the helper virus, whereas B1 and Sat-L does not have a significant role in the virus pathogenesis.	[60-62]
Bromoviridae	Cucumber mosaic virus (CMV) satellite RNA	339	The satRNAs have been characterized from more than 25 isolates around the globe and are classified into necrogenic and benign sat-RNAs determined by the necrogenic domain in the 3’ region of the sat-RNA. Depending on the strains of CMV, satellites can alleviate or elevate the symptoms of pathogenesis.	[63, 64]
	Peanut stunt virus (PSV) satellite RNA	393	PSV satRNAs can either exacerbate or attenuate the symptoms caused by the helper virus based on the strains of PSV. Among many strains of the PSV, some	[65, 66]

			strains might not have or support satRNAs at all. Some strains are infact defined by the association of sat-RNAs.	
Genus *Umbravirus*	Carrot mottle mimic virus (CMMV) satellite RNA	748	Tentative evidences have shown that the satRNAS can aggravate the symptoms caused by the virus in *Nicotiana* spp.	[67]
	Groundnut rosette virus (GRV) satellite RNA	901	The satRNA is the actual cause of the rosette symptoms in the Groundnut. A plant host can harbor more than one form of the satRNAs, relative abundance of the variants result in the exhibited symptoms in the host. The satRNA has also been shown to assist the virus in packaging.	[68-70]
	Pea enation mosaic virus (PEMV) satellite RNA	717	The satRNA can exacerbate or alleviate the symptoms caused by the helper virus. Replication and encapsidation of the satRNA is controlled by the RNA2 of the helper virus.	[71]
	Tobacco bushy top virus (TBTV) satellite RNA	779	The satellite-like RNA has been reported but not published. However, most recently, a satRNA-E has been found to cause Ethiopian Tobacco bushy top disease in combination with an Umbravirus-E and Potato leaf roll virus	[72]
	Circular Sat RNAs			
Secoviridae	Arabis mosaic virus (AMV) small satellite RNA	300	AMV have a large and small satellite. The smaller satRNA is autocatalytic and known to elevate the symptoms of AMV in the indicator plant, Chenopodium quinoa.	[73, 74]
	Chicory yellow mottle virus (CYMV) satellite RNA	457	Two strains of satRNAs, CYMV-L1 and CYMV-S1 has been reported. L1 satRNAs shows no effects on the pathogenesis by the virus, whereas the S1 satRNA attenuates the symptoms induced by the CYMV in *Nicotiana tabacum.*	[75]
	Tobacco ringspot virus (TRSV) satellite RNA	359	Recognized as molecular parasites to the viral pathogenesis so, have been used to produce disease resistant plants. The satRNA occurs in multimeric forms.	[76, 77]
Luteoviridae	Barley yellow dwarf virus (BYDV) -RPV satellite RNA	322	The satRNA is known to reduce viral RNA accumulation and attenuates symptoms in oats.	[78, 79]

Genus Sobemovirus	Lucerne transient streak virus (LTSV) satellite RNA	324	The replication of the satRNA and its relationship with the helper virus is host dependent. The satRNA is supported by multiple helper viruses like cocksfoor mottle virus and turnip rossette virus. The infectivity by the satRNA is structurally preserved.	[80-82]
	Rice yellow mottle virus (RYMV) satellite	220	It is the smallest satRNA reported. It has the highest sequence similarity with satRNA of LTSV, which are diverse in host range and geographical distribution. The satRNA has not shown effects in the helper virus symptoms modulation or pathogenic relationship with the host plant.	[83, 84]
	Solanum nodiflorum mottle virus (SNMV) satellite RNA	377	The satRNA is known to elevate the symptoms in N. clevelandi and the sat RNA is also supported by distantly related LTSV.	[85, 86]
	Subterranean clover mottle virus (SCMV) satellite RNA (2 types)	332, 388	Can infect plants along with LTSV, a distantly related *Sobemovirus.*	[87]
	Velvet tobacco mottle virus satellite RNA (VTMV)	366	The viroid like satRNA is known to be essential for the infectivity by the helper virus. The satRNA is known to have more affinity for the helper virus replicase leading to favored satRNA replication over the helper virus RNA replication.	[88, 89]
	Cherry small circular viroid-like RNA (cscRNA)*	451	The satRNA has been found in cherry trees infected with the cherry chlorotic rusty spot, a fungal disease. So the cscRNA could be the first mycoviral satRNA.	[90-92]

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