

The Rules For The Manufacture, Use, Import, Export And Storage Of Hazardous Micro-Organisms/genetically Engineered organisms Or Cells, 1989

UNION OF INDIA

India

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Rule

THE-RULES-FOR-THE-MANUFACTURE-USE-IMPORT-EXPORT-AND-S of 1989

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The Rules For The Manufacture, Use, Import, Export And Storage Of Hazardous Micro-Organisms/genetically Engineered organisms Or Cells, 1989Vide S.O. 1037(E), dated 5.12.1989, published in the Gazette of India, Ext., Point II, Section 3(i), dated 5.12.1989.

10.

/534In exercise of the powers conferred by sections 6, 8 and 25 of the Environment (Protection) Act, 1986 (26 of 1986) and with a view to protecting the environment, nature and health, in connection with the application of gene-technology and micro-organisms, the Central Government hereby makes the following rules*, namely:

Additional Information6

*Draft Rules- " The Hazardous Micro Organisms and Genetically Modified Organisms (Manufacture, Use, Import and Storage) Rules, 1999, in supersession of the aforementioned Rules, published vide G.S.R. 98(E), dated 19.2.1999.

1. Short title, extent and commencement.

(1)These rules may be called The Rules For The Manufacture, Use, Import, Export And Storage Of Hazardous Micro-Organisms/genetically Engineered Organisms Or Cells, 1989.(2)These rules shall come into operation on the date to be notified for this purpose in the Official Gazette.

2. Application.-

(1)These rules are applicable to the manufacture, import and storage of micro-organisms and gene-technological products.(2)These rules shall also apply to genetically engineered organisms/micro-organisms and cells and correspondingly to any substances and products and food-stuffs, etc., of which such cells, organisms or tissues thereof form part.(3)These rules shall also apply to new gene-technologies apart from those referred to in clauses (ii) and (iv) of rule 3 and these rules shall apply to organisms/micro-organisms and cells generated by the utilisation of such other gene-technologies and to substances and products of which such organisms and cells form part.(4)These rules shall be applicable in the following specific cases(a)sale, offers for sale, storage for the purpose of sale, offers and any kind of handling over with or without a consideration;(b)exportation and importation of genetically engineered cells or organisms;(c)production, manufacturing, processing, storage, import, drawing off, packaging and repackaging of the genetically engineered products;(d)production, manufacture, etc., of drugs and pharmaceuticals and food-stuffs, distilleries and tanneries, etc., which make use of micro-organisms/genetically engineered micro-organisms one way or the other.(5)These rules shall be applicable to the whole of India.

3. Definitions.-

In these rules, unless the context requires,(i)"Biotechnology" means the application of scientific and engineering principles to the processing of materials by biological agents to produce goods and services;(ii)"cell hybridisation" means the formation of live cells with new combinations of genetic material through the fusion of two or more cells by means of methods which do not occur naturally;(iii)["Expert Members:" Director General-Indian Council of Agricultural Research, Director General -Indian Council of Medical Research, Director General-Council of Scientific and Industrial Research, Director General□Health Services, Plant Protection Advisor, Directorate of Plant Protection, Quarantine and Storage, Chairman, Central Pollution Control Board or their representatives not below the rank of Joint Secretary and three outside experts in individual capacity.] [Substituted by G.S.R. 1(E), 23rd December, 2010](iv)"genetic engineering" means the technique by which heritable material which does not usually occur or will not occur naturally in the organism or cell concerned, generated outside the organism or the cell is inserted into said cell or organism. It shall also mean the formation of new combinations of genetic material by incorporation of a cell into a host cell, where they occur naturally (self-cloning as well as modification of an organism or in a cell by deletion and removal of parts of the heritable material;(v)"micro-organisms" shall include all the bacteria, viruses, fungi, mycoplasma, cell lines, algae, protozoans and nematodes indicated in the Schedule and those that have not been presently known to exist in the country.

Prior to substitution by G.S.R. 1(E), 23rd December, 2010 on 23.12.2010 the clause (iii) read under;(iii) "gene technology" means the application of the gene technique called genetic engineering, include self-cloning and deletion as well as cell hybridisation;

4. Competent Authorities.-

(1)Recombinant DNA Advisory Committee (RDAC).-This Committee shall review developments in Biotechnology at national and international levels and shall recommend suitable and appropriate safety regulations for India in recombinant research, use and applications from time to time. The Committee shall function in the Department of Biotechnology.(2)Review Committee on Genetic Manipulation (RCGM).-This Committee shall function in the Department of Biotechnology to monitor the safety related aspects in respect of on-going research projects and activities involving genetically engineered organisms/ hazardous micro-organisms. The Review Committee on Genetic Manipulation shall include representatives of (a) Department of Biotechnology (b) Indian Council of Medical Research (c) Indian Council of Agricultural Research (d) Council of Scientific and Industrial Research (e) other experts in their individual capacity. Review Committee on Genetic Manipulation may appoint sub-groups.It shall bring out manuals of guidelines specifying procedure for regulatory process with respect to activities involving genetically engineered organisms in research, use and applications, including industry, with a view to ensure environmental safety. All on-going projects involving high risk category and controlled field experiments shall be reviewed to ensure that adequate precautions and containment conditions are followed as per the guidelines.The Review Committee on Genetic Manipulation shall lay down procedures restricting or prohibiting production, sale, importation and use of such genetically engineered organisms or cells as are mentioned in the Schedule.(3)Institutional Biosafety Committee (IBSC).-This Committee shall be constituted by an occupier or any person, including research institutions, handling micro-organisms/genetically engineered organisms. The Committee shall comprise the Head of the Institution, scientists engaged in DNA work, a medical expert and a nominee of the Department of Biotechnology. The occupier or any person including research institutions handling micro-organisms/genetically engineered organisms shall prepare, with the assistance of the Institutional Biosafety Committee (IBSC), an up-to-date on-site emergency plan according to the manuals/ guidelines of the RCGM and make available copies to the District Level Committee/State Biotechnology Co-ordination Committee and the Genetic Engineering Approval Committee.(4)Genetic Engineering Approval Committee (GEAC).-This Committee shall function as a body under the Department of Environment, Forests and Wildlife for approval of activities involving large scale use of hazardous micro-organisms and recombinants in research and industrial production from the environmental angle. The Committee shall also be responsible for approval of proposals relating to release of genetically engineered organisms and products into the environment, including experimental field trials.(5)State Biotechnology Co-ordination Committee (SBCC).-There shall be a State Biotechnology Co-ordination Committee in the States wherever necessary. It shall have powers to inspect, investigate and take punitive action in case of violation of statutory provisions through the Nodal Department and the State Pollution Control Board /Directorate of Health/Medical Services. The Committee shall review periodically the safety and control measures in the various industries/ institutions handling genetically engineered organisms /hazardous micro-organisms.(6)District Level Committee (DLC).-There shall be a District Level Biotechnology Committee (DLC) in the districts wherever necessary under the District Collectors to

monitor the safety regulations in installations engaged in the use of genetically modified organisms /hazardous micro-organisms and its applications in the environment. The District Level Committee or any other persons authorised in this behalf shall visit the installation engaged in activity involving genetically engineered organisms, hazardous micro-organisms, formulate an information chart, find out hazards and risks associated with each of these installations a. . co-ordinate activities with a view to meeting any emergency. They shall al,,,) prepare an off-site emergency plan. The District Level Committee shall regularly submit its report to the State Biotechnology Co-ordination Committee and the Genetic Engineering Approval Committee.

5. Classification of micro-organisms or genetically engineered product.-

(1)For the purpose of these rules, micro-organisms or genetically engineered organisms, products or cells shall be dealt with under two major heads: animal pathogens and plant pests and these shall be classified in the manner specified in the Schedule.(2)If any of the micro-organisms/genetically engineered organism or cell falls within the limits of more than one risk class as specified in the Schedule, it shall be deemed to belong exclusively to the last in number of such classes.

6. Micro-organisms laid down in the Schedule are divided into the following.

(i)Bacterial Agents;(ii)Fungal Agents;(iii)Parasitic Agents;(iv)Viral, Rickettsial and Chlamydial Agents;(v)Special Category.

7. Approval and prohibition, etc.-

(1)No person shall import, export, transport, manufacture, process, use or sell any hazardous micro-organism or genetically engineered organism/ substance or cell except with the approval of the Genetic Engineering Approval Committee.(2)Use of pathogenic micro-organism or any genetically engineered organism or cell for the purpose of research shall only be allowed in laboratories or inside laboratory areas notified by the Ministry of Environment and Forests for this purpose under the Environment (Protection) Act, 1986.(3)The Genetic Engineering Approval Committee shall give directions to the occupier to determine or take measures concerning the discharge of micro-organisms/genetically engineered organisms or cells mentioned in the Schedule from the laboratories, hospitals and other areas including prohibition of such discharges and laying down measures to be taken to prevent such discharges.(4)Any person operating or using genetically engineered organisms/ micro-organisms mentioned in the Schedule for scale up or pilot operations shall have to obtain licence issued by the Genetic Engineering Approval Committee for any such activity. The possessor shall have to apply for licence in the prescribed proforma.(5)Certain experiments for the purpose of education within the field of gene technology or micro-organism may be carried outside the laboratories and laboratory areas mentioned in sub-rule (2) and will be looked after by the Institutional Biosafety Committee.

8. Production.-

Production in which genetically engineered organisms or cells or micro-organisms are generated or used shall not be commenced except with the consent of Genetic Engineering Approval Committee with respect to the discharge of genetically engineered organisms or cells into the environment. This shall also apply to production taking place in connection with development, testing and experiments where such production, etc., is not subject to rule 7.

9. Deliberate or unintentional release.-

(1)Deliberate or unintentional release of genetically engineered organisms /hazardous micro-organisms or cells, including deliberate release for the purpose of experiment shall not be allowed.Note.-Deliberate release shall mean any intentional transfer of genetically engineered organisms/ hazardous microorganisms or cells to the environment or nature, irrespective of the way in which it is done.(2)The Genetic Engineering Approval Committee may in special cases give approval of deliberate release.

10. Permission and approval for certain substances.

-Substances and products, which contain genetically engineered organisms or cells or micro-organisms shall not be produced, sold, imported or used except with the approval of the Genetic Engineering Approval Committee.

11. Permission and approval for food-stuffs.

-Food-stuffs, ingredients in food-stuffs and additives, including processing aids, containing or consisting of genetically engineered organisms or cells, shall not be produced, sold, imported or used except with the approval of the Genetic Engineering Approval Committee.

12. Guidelines.-

(1)Any person who applies for approval under rules 8-11 shall, as determined by the Genetic Engineering Approval Committee submit information and make examinations or cause examinations to be made to elucidate the case, including examinations according to specific directions and at specific laboratories. He shall also make available an on-site emergency plan to the Genetic Engineering Approval Committee before obtaining the approval. If the authority itself makes an examination it self, it may order the applicant to defray the expenses incurred by it in doing so.(2)Any person to whom an approval has been granted under rules 8-11 above shall notify the Genetic Engineering Approval Committee of any change in or addition to information already submitted.

13. Grant of approval.

(1) In connection with the granting of approval under rules 8-11 above, terms and conditions shall be stipulated, including terms and conditions as to the control to be exercised by the applicant, supervisions, restriction on use, the layout of the enterprise and as to the submission of information to the State Biotechnology Co-ordination Committee or to the District Level Committee. (2) All approvals of the Genetic Engineering Approval Committee shall be for a specified period not exceeding four years at the first instance renewable for 2 years at a time. The Genetic Engineering Approval Committee shall have powers to revoke such approval in the following situations: (a) if there is any new information as to the harmful effects of the genetically engineered organisms or cells; (b) if the genetically engineered organisms or cells cause such damage to the environment, nature or health as could not be envisaged when the approval was given; or (c) non-compliance of any condition stipulated by the Genetic Engineering Approval Committee.

14. Supervision.-

(1) The Genetic Engineering Approval Committee may supervise the implementation of the terms and conditions laid down in connection with the approvals accorded by it. (2) The Genetic Engineering Approval Committee may carry out this supervision through the State Biotechnology Co-ordination Committee or the State Pollution Control Board/District Level Committee or through any person authorised in this behalf.

15. Penalties.-

(1) If an order is not complied with, the District Level Committee or State Biotechnology Co-ordination Committee may take measures at the expense of the person who is responsible. (2) In case where immediate intervention is required in order to prevent any damage to the environment, nature or health, the District Level Committee or State Biotechnology Co-ordination Committee may take the necessary steps without issuing any orders or notice. The expenses incurred for this purpose will be repayable by the person responsible for such damage. (3) The State Biotechnology Co-ordination Committee / District Level Committee may take samples for a more detailed examination of organisms and cells. (4) The State Biotechnology Co-ordination Committee/ District Level Committee shall be competent to ask for assistance from any other Government authority to carry out its instructions.

16. Responsibility to notify interruption or accidents.-

(1) Any person who under rules 7-11 is responsible for conditions or arrangements shall immediately notify the District Level Committee, State Biotechnology Co-ordination Committee and the State medical officer of any interruption of operations or accidents that may lead to discharges of genetically engineered organisms or cells which may be harmful to the environment, nature of health or involve any danger thereto. (2) Any notice given under sub-rule (1) above shall not lessen the duty of the person who is responsible to try effectively to minimise or prevent the effects of

interruption of operations or accidents.

17. Preparation of Off-site Emergency Plan by the DLC.

(1)It shall be the duty of the DLC to prepare an off-site emergency plan detailing how emergencies relating to a possible major accident at a site will be dealt with and in preparing the plan, the DLC shall consult the occupier and such other person as it may deem necessary.(2)For the purpose of enabling the DLC to prepare the emergency plan required under sub-rule (1), the occupier shall provide the DLC with such information relating to the handling of hazardous micro-organisms/ genetically engineered organisms under his control as the DLC may require, including the nature, extent and likely off-site effects of a possible major accident and the DLC shall provide the occupier with any information from the off-site emergency plan which relates to his duties under rule 16.

18. Inspection and information regarding finance.-

(1)The State Biotechnology Co-ordination Committee or the Genetic Engineering Approval Committee/the DLC or any person with special knowledge duly authorised by the State Biotechnology Co-ordination Committee or the Genetic Engineering Approval Committee or the DLC where it is deemed necessary, at any time on due production of identity be admitted to public as well as to private premises and localities for the purpose of carrying out supervision.(2)Any person who is responsible for activities subject to rules 7-11 above shall at the request of District Level Committee or State Biotechnology Co-ordination Committee or the Genetic Engineering Approval Committee submit all such information, including information relating to financial conditions and accounts, as is essential to the authority's administration under these rules. He shall also follow supervision or inspection by the authorities or persons indicating in sub-rule (1).(3)The Genetic Engineering Approval Committee may fix fees to cover, in whole or in part, the expenses incurred by the authorities in connection with approvals, examination, supervision and control.

19. Appeal.-

(1)Any person aggrieved by a decision made by the Genetic Engineering Approval Committee/State Biotechnology Co-ordination Committee in pursuance of these rules may within thirty days from the date on which the decision is communicated to him, prefer an appeal to such authority as may be appointed by the Ministry of Environment and Forests provided that the Appellate Authority may entertain the appeal after the expiry of the said period of thirty days if such authority is satisfied that the appellant was prevented by sufficient cause from filing the appeal in time.

20. Exemption.

-The Ministry of Environment and Forests shall, wherever necessary, exempt an occupier handling a particular micro-organism/ genetically engineered organism from rules 7-11.

Schedule

A. ANIMAL AND HUMAN PATHOGENS
BACTERIAL
Risk Group II
Acinetobacter calcoaceticus
Actinobacillus-all species except *A. mallei*, which is in Risk Group III
Aeromonas hydrophila
Arizona hinshawii-all serotypes
Bacillus anthracis
Bordetella all species
Borrelia recurrentis
B. Vincenti
Campylobacter fetus
Camphylobacter jejuni, *Chlamydia psittaci*
Cheamydia trachomatis
Clostridium chauvoei, *Cl. difficile* *Cl./fallax*. *Cl. haemolyticum* *Q. histolyticum*, *Cl. novyi*(*Cl.*, *Pefringes*) *Cl. speticum*, *Cl. sordelli*
Corynebacterium diphtheriae, *C. equi*, *C. haemolyticum*, *C. Pseudotuberculosis*, *C. pyogenes*, *C. renale*
Diplococcus(*Streptococcus*)*pneumoniae*
Edwardsiella tarda
Erysipelothrix insidiosa
Escherichia Coli-all enteropathogenic serotypes, enterotoxigenic
Haemophilus ducreyi, *H. influenzae*, *H. pneumoniae*
Herellea vaginicola
Klebsiella-all species and all serotypes
Legionella pneumophila
Letionella
Leptospira interrogans-all serotypes reported in India
Listeria, all species
Mima polymorpha
Moraxella-all species
Mycobacteria-all species including *Mycobacterium avium*
M. Bovis *M. tuberculosis*, *M. Leprae*
Mycoplasma-all species except *M. Mycoides* and *M. angalactiae*
Meosseroc gonorrhoea, *N. Leprae*
Mycoplasma-all species except *M. Mycoides* and *M. angalactiae*
Neisseric gonorrhoea, *N. meningitis*
Pasteurella-all species except those listed in Risk Group III
Salmonella-all species and all setotypes
Shigella-all species and all serotypes
Sphaerophorgs necrophorus
Staphylococcus aureus
Streptobacillus moniliformis
Streptococcus pneumoniae
Streptococcus pyogenes. *S. equi*
Streptomyces madurae, *s. pelleteri*, *s. somaliensis*
Treponema carateum, *T. pallidam* and *T. pettenue*
Vibrio fetus
V. comma including biotype EI Top and *V. parahemolyticus*
Vibrio cholerae
Risk Group III:
Actinobacillus mallei
Bartonella-all species
Brucella-all species
Clostridium botulium
Cl. tetani
Francisella tularensis
Mycobacterium avium, *. M. bovis*, *M. tuberculosis*, *m. leprae*
Pasteurella multocida type B("buffalo" and other foreign virulent strains)
Pseudomonas pseudomallai
Yersinia pestis
FUNGAL
Risk Group II
Actinomycetes(including *Nocardia* SP, *Actinomyces* species and *Arachina propinica*)
Aspergillus fumigatus
Blastomyces dermatitis
Cryptococcus neoformans *C. fersiminosos*
Epidermophyton madurella, *microsporon*
Paracoccidioides brasiliensis
Sporothrix
Trichoderma
Trichophyton
Risk Group III
Coccidioides immitis
Histoplasma capulatum
Histoplasma capsulatum var *duboisii*
PARASITIC
Risk Group II
Entahoeba histolytica
Leishmania species
Naegleria gruberia
Plasmodium theilera, *P. babesia*, *P. falcoparum*
Plasmodium babesia
Schistosoma
Toxoplasma gondii
Toxocana canis
Trichinella spiralis
Trichomanas
Trypanosoma cruzi
Risk Group III
Schisistosoma mansonii
VIRAL RICKETTSIAL AND CHALMYDIAL
Risk Group II
Adenoviruses- Human all types
Avian loukosis
Cache Valley virus
CELO(avian adenovirus)
Coxsackie A and B viruses
Corona viruses
Cytomegalo viruses
Dengue virus, when used for transmission experiments
Echo viruses - all types
Encephalomyocarditis virus (EMC)
Flanders virus
Hart Part virus
Hepatitis- associated antigen material - hepatitis A and B viruses, non A and non B, HDV
Herpes viruses - except herpesviruses simiae (monkey B virus) which is in Risk Group IV.
Infectious Bovine Rhinotraechitis virus (IBR)
Infectious Bursal diseases of poultry and Infectious Bronchitus
Infectious Laryngotraechitis (ILT)
Influenza virus - all types, except A PR 834 which is in Risk Group I
Langat virus
Leucosis Complex
Lymphogranuloma venereum agent
Marek's Disease virus
Measles virus
Mumps virus
Newcastle disease virus (other than licenced strain for vaccine use)
Parainfluenza viruses - all type except parainfluenza virus 3, SF4 strain, which is in Risk Group I
Polio viruses - all types, wild and attenuated
Poxviruses- all types except Alastrim, monkey pox, sheep pox and white pox,

which depending on experiments are in Risk Group III or IV. Rabies virus - all strains except rabies street virus, which should be classified in Risk Group III when inoculated into carnivores. Reoviruses- all types. Respiratory syncytial virus. Rhinoviruses- all types. Rinderpest (other than vaccine strain in use). Rubella virus. Simian viruses - all types except herpesvirus simlae (Monkey Virus) which is in Risk Group IV. Simian virus 40 -- Ad 7 SV 40 (defective). Sindbis virus. Tensaw virus. Turlock virus. Vaccinia virus. Varicella virus. Vole rickettsia. Yellow fever virus, 17D vaccine strain. Risk Group III African Horse Sickness (attenuated strain except animal passage) Alastrim, monkey pox and whitepox, when used in vitro. Arboviruses - All strains except those in Risk Group II and IV. Blue tongue virus (only serotypes reported in India). Ebola fever virus. Feline Leukemia Epstein-Barr virus. Feline sarcoma. Foot and Mouth Disease virus (all serotypes and subtypes). Gibbon Ape Lymphosarcoma. Herpesvirus atles. Herpesvirus saimiri. Herpes simplex 2. HIV-I & HIV-2 and strains of SIV. Infectious Equine Anaemia. Lymphocytic choriomeningitis virus (LCM). Monkey pox, when used in vitro. Non-defective Adeno-2 SV-40 hybrids. Psittacosis-ornithosis-trachoma group of agents. Pseudorabies virus. Rabies street virus, when used in inoculations of carnivores. Rickettsia-all species except Vole rickettsia and Coxiella burnetii when used for vector transmission or animal inoculation experiments. Sheep pox (field strain). Swine Fever virus. Vesicular stomatitis virus. Woolly monkey Fibrosarcoma. Yaba pox virus. Risk Group IV Alastrim, monkey pox, whitepox, when used for transmission or animal inoculation experiments. Hemorrhagic fever agents, including Crimean hemorrhagic fever (congo). Korean hemorrhagic fever and others as yet undefined. Herpesvirus simlae (monkey B virus). Tick-borne encephalitis virus complex, including - Russian Spring Summer Encephalitis, Kyasanur Forest Disease, Omsk hemorrhagic fever and Central European encephalitis viruses. SPECIAL CATEGORY BACTERIAL Contagious Equine Metritis (H. equigenitalis). Pestis petiti de ruminantium. VIRAL RICKETTSIAL AND CHLAMYDIAL African Horse Sickness virus (serotypes not reported in India and challenge strains). African Swine Fever. Bat rabies virus. Blue tongue virus (serotypes not reported in India). Exotic FMD virus types and sub-types. Junin and Machupo viruses. Lassa virus. Marburg virus. Murray valley encephalitis virus. Rift Valley Fever virus. Smallpox virus - archival storage and propagation. Swine Vesicular Disease. Venezuelan equine encephalitis virus - epidemic strains. Western Equine encephalitis virus. Yellow fever virus - Wild strain. Other Arboviruses causing epizootics and so far not recorded in India. B. PLANT PESTS Any living stage (including active and dormant forms) of insects, mites, nematodes, slugs, snails, bacteria, fungi, protozoa, other parasitic plants or reproductive parts thereof: viruses; or any organisms similar to or allied with any of the foregoing; or any infectious agents or substances, which can directly or indirectly injure or cause disease or damage in or to any plants or parts thereof, or any processed, manufactured, or other products of plants are considered plant pests. Organisms belonging to all lower Taxa contained within the group listed are also included.

1. Viruses:

All viroids. All bacterial, fungal, algal, plant, insect and nematode viruses; special care should be taken for: i. i. Geminiviruses, ii. ii. Caulimoviruses, iii. iii. Nuclear Polyhedrosis viruses, iv. iv. Granulosis viruses, and v. v. Cytoplasmic polyhedrosis viruses.

2. Bacteria:

Family Pseudomonadaceae Genus Pseudomonas Genus Xanthomonas Genus Azotobacter Family Rhizobiaceae Genus Rhizobium/Azorhizobium Genus Bradyrhizobium Genus Agrobacterium Genus Phyllobacterium Genus Erwinia Genus Enterobacter Genus Klebsiella Family Spiroplasmaceae Genus Spiroplasma Genus Acquispirillum Genus Oceanospirillum Family Streptomyetaceae Genus Streptomyces Genus Nocardia Family Actinomycetaceae Genus Actinomyces Coryneform Group Genus Clavibacter Genus Arthrobacter Genus Curtobacterium Genus Bdellovibrio Family Rickettsiaceae Rickettsial-like organisms associated with insect diseases Gram-negative phloem-limited bacteria associated with plant diseases Gram-negative xylem-limited bacteria associated with plant diseases Cyanobacteria - All members of blue-green algae Mollicutes Family Spiroplasmataceae Mycoplasma-like organisms associated with plant diseases Mycoplasma-like organisms associated with insect diseases Algae Family Chlorophyceae Family Euglenophyceae Family Pyrophyceae Family Chrysophyceae Family Phaeophyceae Family Rhodophyceae Fungi Family Plasmodiophoraceae Family Chytridiaceae Family Olpidiopsidaceae Family Synchytriaceae Family Catenariaceae Family Coelomomycetaceae Family Saprolegniaceae Family Zoopagaceae Family Albuginaceae Family Peronosporaceae Family Pythiaceae Family Mucoraceae Family Choanephoraceae Family Mortierellaceae Family Endogonaceae Family Syncephalastraceae Family Dimargaritaceae Family Kickxellaceae Family Saksenaeaceae Family Entomophthoraceae Family Ecerinaceae Family Taphrinaceae Family Endomycetaceae Family Saccaromycetaceae Family Eurotiaceae Family Gymnoascaceae Family Ascomycetaceae Family Onygenaceae Family Microascaceae Family Protomycetaceae Family Elsinoeaceae Family Myriangiaceae Family Dothidiaceae Family Chaetothyriaceae Family Parmulariaceae Family Phillipsiellaceae Family Hysteriaceae Family Pleosporaceae Family Melamomataceae Family Ophiostomataceae Family Aseosphaeriaceae Family Erysiphaceae Family Meliolaceae Family Xylariaceae Family Diaporthaceae Family Hypoeraceae Family Clavicipitaceae Family Phacidiaceae Family Ascocorticiaceae Family Hemiphacidiaceae Family Dermataceae Family Sclerotiniaceae Family Cyttariaceae Family Helosiaceae Family Sarcostomataceae Family Sarcoscyphaceae Family Auriculariaceae Family Ceratobasidiaceae Family Corticiaceae Family Hymenochaetaceae Family Echinodontiaceae Family Eistuliniaceae Family Clavariaceae Family Polyporaceae Family Tricholomataceae Family Ustilaginaceae Family Sporobolomycetaceae Family Uredinaceae Family Agaricaceae Family Graphiolaceae Family Pucciniaceae Family Melampsoraceae Family Gandodermataceae Family Laboulbeniaceae Family Sphaeropsidaceae Family Melabconiaceae Family Tuberculariaceae Family Dematiaceae Family Moniliaceae Family Agonomucetaceae Parasitic Weeds Family Balanophoraceae-parasitic species Family Cuscutaceae-parasitic species Family Tylodendraceae-parasitic species Family Lauraceae-parasitic species Genus Cassytha Family Lennoaceae-parasitic species Family Loranthaceae-parasitic species Family Myzodendraceae-parasitic species Family Olacaceae-parasitic species Family Orobanchaceae-parasitic species Family Rafflesiaceae-parasitic species Family Santalaceae-parasitic species Family Scrophulariaceae-parasitic species Protozoa Genus Phytomonas And all protozoa associated with insect diseases. Nematodes Family Anguinidae Family Belonolaimidae Family Calosittidae Family Crictonematidae Family Dolichodoridae Family Fergusoniidae Family Hemicycliphoridae Family Heteroderidae Family Hoplolaimidae Family Meloidogynidae Family Neotylenchidae Family Nothotylenchidae Family Paratylenchidae Family Pratylenchidae Family

TylenchidaeFamily TylenchulidaeFamily AphelenchoididaeFamily LongidoridaeFamily
 TrichodoridaeMolluscaSuperfamily PlanorbaceaSuperfamily AchatinaceaSuperfamily
 ArionaceaSuperfamily LimacaceaSuperfamily HelicaceaSuperfamily
 VeronicellaceaArthropodaSuperfamily AscoideaSuperfamily DermanyssoideaSuperfamily
 ErjophyoideaSuperfamily TetranychoidaeSuperfamily EupodoideaSuperfamily
 TydeoideaSuperfamily ErythraenoideaSuperfamily TrombidioideaSuperfamily
 HydryphantoideaSuperfamily TarasonemoideaSuperfamily PyemotoideaSuperfamily
 HemisarcoptoideaSuperfamily AcaroideaOrder PolydesmidaFamily SminthoridaeFamily
 ForficulidaeOrder IsopteraOrder ThysanopteraFamily AcrididaeFamily GryllidaeFamily
 GryllacrididaeFamily GryllotalpidaeFamily PhasmatidaeFamily RonaleidaeFamily
 TettigoniidaeFamily TetragnathidaeFamily ThaumastocoridaeSuperfamily PlesiomorphaSuperfamily
 LygacidaeSuperfamily IdiostoloideaSuperfamily CoreidaeSuperfamily PentatomidaeSuperfamily
 PyrrhocoridaeSuperfamily TingidaeSuperfamily MiroideaOrder HomopteraFamily
 AnobiidaeFamily ApionidaeFamily AnthribidaeFamily BostrichidaeFamily BrentidaeFamily
 BruchidaeFamily BuprestidaeFamily ByturidaeFamily CantharidaeFamily CarabidaeFamily
 CeambycidaeFamily ChrysomelidaeFamily CoecinelidaeFamily CurculionidaeFamily
 DermestidaeFamily ElateridaeFamily HydrophilidaeFamily LyctidaeFamily MeloidaeFamily
 MordellidaeFamily PlatypodidaeFamily ScarabaeidaeFamily ScolytidaeFamily SelysidaeOrder
 LepidopteraFamily AgromyzidaeFamily AnthomyiidaeFamily CecidomyiidaeFamily
 ChironomidaeFamily EphydriidaeFamily LonchaeidaeFamily MuscidaeFamily OtitidaeFamily
 SyrphidaeFamily TephritidaeFamily TipulidaeFamily ApidaeFamily CaphidaeFamily
 ChalcidaeFamily CynipidaeFamily EurytomidaeFamily FormicidaeFamily PsilidaeFamily
 SireidaeFamily TenthredinidaeFamily TorymidaeFamily Xylopiidae and