
RULES FOR THE MANUFACTURE, USE, IMPORT, EXPORT AND STORAGE OF HAZARDOUS MICRO ORGANISMS/GENETICALLY ENGINEERED ORGANISMS OR CELLS

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SCHEDULE 1 :- Bacterial

RULES FOR THE MANUFACTURE, USE, IMPORT, EXPORT AND STORAGE OF HAZARDOUS MICRO ORGANISMS/GENETICALLY ENGINEERED ORGANISMS OR CELLS

In exercise of the powers conferred by Sections 6, 8 and 25 of the Environment (Protection) Act, 1986 (29 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:

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.

(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 apply to genetically engineered organisms/microorganisms and cells and correspondingly to any substances and products and food stuffs, etc., of which such cells, organisms to tissues hereof 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) "Gene Technology" means the application of the gene technique called genetic engineering, include self cloning and deletion as well as cell hybridisation;

(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, cells lines, algae, Protozoans and nematodes indicated in the schedule and those that have not been presently known to exist in the country or not have been discovered so far.

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.

(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. The composition of the Committee shall be.

(i) Chairman: Additional Secretary, Department of Environment, Forests and Wildlife. Co-Chairman: Representative of Department of Bio-technology.

(ii) Members: Representatives of concerned Agencies and Departments, namely, Ministry of Industrial Development, Department of Biotechnology and the Department of Atomic Energy.

(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 Adviser, Directorate of Plant Protection, Quarantine and Storage, Chairman, Central Pollution Control Board and three outside experts in individual capacity.

(iv) Member Secretary: An official of the Department of Environment Forest and Wildlife. The Committee may co-opt other members/experts as necessary. The Committee or any person/s authorised by it shall have powers to take punitive actions under the Environment (Protection) Act.

(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 violations 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. The compositions of the Co- ordination Committee shall be.

| | | |
|--------|--|------------------|
| (i) | Chief Secretary | Chairman |
| (ii) | Secretary, Department of Environment | Member-Secretary |
| (iii) | Secretary, Department of Health | Member |
| (iv) | Secretary, Department of Agriculture | Member |
| (v) | Secretary, Department of Industries and Commerce | Member |
| (vi) | Secretary, Department of Forests | Member |
| (vii) | Secretary, Department of Public Works/ Chief Engineer, Department of Public Health Engineering | Member |
| (viii) | State Microbiologists and Pathologists | Member |
| (ix) | Chairman of State Pollution Control Board | Member |

The committee may co-opt other members/experts as necessary.

(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 person/s authorised in this behalf shall visit the installation engaged in activity involving genetically engineered organisms, hazardous micro-organisms, formulate information chart, find out hazards and risks associated with each of these installations and co-ordinate activities with a view to meeting any emergency. They shall also prepare an off-site emergency plan. The District Level Committee shall regularly submit its report to the State Biotechnology Co-ordination Committee/Genetic Engineering Approval Committee. The District Level Committee shall comprise of.

| | | |
|--------|--|-------------------|
| (i) | District Collector | Chairman |
| (ii) | Factory Inspector | Member |
| (iii) | A representative of the Pollution Control Board | Member |
| (iv) | Chief Medical Officer (District Health Officer) | Member (Convenor) |
| (v) | District Agricultural Officer | Member |
| (vi) | A representative of the Public Health Engineering Department | Member |
| (vii) | District Microbiologists / Pathologist (technical expert) | Member |
| (viii) | Commissioner Municipal Corporation | Member |

The Committee may co-opt other members/experts as necessary.

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 Prohibitions, etc :-

(1) No person shall import, export, transport, manufacture, process, use or sell any hazardous micro-organisms or genetically engineered organisms/substances or cells except with the approval of the Genetic Engineering Approval Committee.

(2) Use of pathogenic micro-organisms or any genetically engineered organisms or cells for the purpose of research shall only

be allowed in laboratories or inside laboratory area 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 discharge 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 prescribed proforma.

(5) Certain experiments for the purpose of education within the field of gene technology or micro-organism may be carried out 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 of 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.

(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 microorganisms shall not be produced, sold,

imported or used except with the approval of 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 Generic Engineering Approval Committee.

12. Guidelines :-

(1) Any person who applies for approval under Rules 8 to 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 onsite emergency plan to GEAC before obtaining the approval. If the authority makes examination itself, it may order the applicant to defray the expenses incurred by it in so doing.

(2) Any person to whom an approval has been granted under Rules 8 to 11 above shall notify the Genetic Engineering Approval Committee of any change in or addition to the information already submitted.

13. Grant of approval :-

(1) In connection with the granting of approval under Rules 8 to 11 above, terms and conditions shall be stipulated, including terms and conditions as to the control to be exercised by the applicant, supervision, 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 specific 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 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 Boards/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 order or notice. The expenses incurred for this purpose will be repayable by the person responsible for such damage. sold, imported or used except with the approval of the Generic Engineering Approval Committee.

16. Responsibility to notify interruptions or accidents :-

(1) Any person who under Rules 7 to 11 is responsible for conditions or arrangements shall immediately notify the District Level Committee/State Biotechnology Coordination 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 or 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 interruptions 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 affects 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. Inspections and informations 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 to 11 above shall at the request of District Level Committee or State Biotechnology Co-ordination Committee or the GEAC 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 allow supervision or inspection by the authorities or persons indicated 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, examinations, supervisions and control.

19. Appeal :-

(1) Any person aggrieved by a decision made by 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 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 to 11.

SCHEDULE 1

Bacterial

| Animal and Human Pathogens | |
|-----------------------------------|---|
| SCHEDULE | |
| Bacterial | |
| Risk Group II | |
| | Acinetobacter calcoaceticus |
| | Actinobacillus all species except A mallei, which is in Risk Group III |
| | Aeromonas hydrophila |
| | Arizona hinshawii all sero-types |
| | Bacillus anthracis |
| | Bordetella all species |
| | Borrelia recurrentis B. vincenti |
| | Campylobacter fetus |
| | Campylobacter jejuni |
| | Chlamydia psittaci |
| | Chlamydia trachomatis |
| | Clostridium chauvoei, Cl. Difficile Cl. fallax, C. haemolyticum Cl. histolyticum, |
| | Cl. novyi, (Cl. perfringens), Cl. septicum, Cl. Sordelli |
| | Corynebacterium diphtheriae, |
| | C. equi, C. haemolyticum, C. pseudo tuberculosis, 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 Legionella

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. agalactiae

Neisseria gonorrhoea, N. meningitis

Pasteurella all species except those listed in

Risk Group III

Salmonella all species and all serotypes

Shigella all species and all serotypes

Sphaerophorus necrophorus

Staphylococcus aureus

Streptobacillus moniliformis

Streptococcus pneumoniae

Streptococcus pyogenes, S. equi

Streptomyces madurae, S. pelleteri, S. somaliensis

Treponema carateum, T. pallidum and T. pertenue

Vibrio fetus, V. comma including biotype El Tor 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 No-cardia Sp., Actinomyces species and Arachina prpinica)

Aspergillus fumigatus

Blastomyces dermatitis

Cryptococcus neoformans C. fersiminosos

Epidermophyton madurella, microsporon

Paracoccidioides brasiliensis Sporothrix

Trichoderma

Trichophyton

Risk Group III

Coccidioides immitis Histoplasma capsulatum

Histoplasma capsulatum var buboissl

Parasitic

Risk Group II

Entamoeba histolytica Leishmania species

Naegleria gruberia

Plasmodium theilera, P. babesia P. falcoparum

Plasmodium babesia Schistosoma

Toxoplasma gondii Toxocara canis

Trichinella spiralis

Trichomanas

Trypanosoma cruzi

Risk Group III

Schistosoma mansoni

Viral Rickettsial and Chlamydial Risk Group II

Adenoviruses Human, all types

Avian leukosis

Cache Valley virus CELO (avian adenovirus)

Cosackie 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 Port virus

Hepatitis associated antigen material hepatitis A and B viruses,
non A and non B, HDV.

Herpes viruses except herpes-virus simiae (monkey B virus)
which is in

Risk Group IV.

Infectious Bovine

Rhinotracheitis virus (IBR).

Infectious

Bursal diseases of poultry and infectious

Bronchitis

Infectious Laryngotracheitis (ILT)

Influenza virus all types, except

A/PR. 8/34 which is in

Risk Group I

Langkat virus

Leucosis Complex

Lymphogranuloma venereum agent

Marek's Disease virus

Measles virus Mumps virus

Newcastle disease virus (other than licensed strain for vaccine use)

Parasinfluenza viruses all types 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 simiae

(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 Groups II and IV

Blue tongue virus

(only serotypes reported in India)

Ebola fever virus Epstein Barr virus Feline Leukemia Feline Sarcoma

Foot and Mouth Disease virus (all serotypes and sub-types)

Gibbon Ape Lymphosarcoma herpesvirus ateles herpesvirus saimiri herpes simplex 2

HIV - 1 and 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 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, monkeypox, 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 simiae (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. equitalis) 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)

Exoitic FMD virus types and sub-types

Junin and Machupo viruses

Lassa virus

Marburg virus

Murrey valley encephalitis virus

Rift Valley Fever virus

Smallpox virus

Archieval storage and propagation Swine

Vesicular Disease

Veneseulan equine encephalitis virus epidemic strains

Western Equine encephalitis virus

Yellow fever virus Wild strain

Other Arboviruses causing esi-zootics 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) Gemini viruses;

(ii) Caulimo viruses;

- (iii) Nuclear Polyhedrosis viruses;
- (iv) Granulosis viruses; and
- (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 Entrobacter

Genus Klebsiella

Family Spirochaetaceae

Genus Azospirillum

Genus Aquaspirillum

Genus Oceanospirillum

Family Streptomyces

Genus Streptomyces

Genus Nothia

Family Actinomycetaceae

Genus Actinomyces

Corynebacterium 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

Cynobacteria 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 Chrysophaceae

Family Phaephyceae

Family Rhodophyceae Fungi

Family Plasmodiophoraceae

Family Chytridiaceae

Family Olpidiopsidaceae

Family Synchytriaceae

Family Catenariaceae

Family Coelomomyctaceae

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 Saceharomycetaceae
Family Eurotiaceae
Family Gymnoascaceae
Family Aseophaeriaceae
Family Onygenaceae
Family Microascaceae
Family Protomycetaceae
Family Elsinoeaceae
Family Myriagiaceae
Family Dothidiaceae
Family Chactothyriaceae
Family Pharmulariaceae
Family Phillipriellaceae
Family Gysteriaceae
Family Pleosporaceae
Family Melamomataceae
Family Ophiostomatacea.e
Family Aeosphaeriaceae
Family Erysiphaceae
Family Meliolaceae
Family Xylariaceae
Family Diaporthaceae
Family Hypoereaceae

Family Clavicipataceae
Family Phacidiaceae
Family Ascocorticiaceae
Family Hemiphacidiaceae
Family Dermataceae
Family Sclerotiniaceae
Family Cyttariaceae
Family Helosiaceae
Family Sarocostomataceae
Family Sarcoscyphaceae
Family Auricolariaceae
Family Ceratobasidiaceae
Family Corticiaceae
Family Hymenochaetaceae
Family Echinodintiacae
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 Aganomucetaceae

Parasitic Weeds

Family Balanophoraceae-parasitic species

Family Cuscutaceae-parasitic species

Family Thydonoraceae-parasitic species

Family Lauraceae-parasitic species Genus Cassytha

Family Leranthoaceae-parasitic species

Family Myzodendraceae-parasitic species

Family Olacaceae-parasitic species

Family Qrobanchaceae-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 Caloosiidae

Family Cariconematidae

Family Dolichodoridae

Family Fergusobiidae

Family Hemicycliophoridae

Family Heteroderidae

Family Hoplolaimidae

Family Meloidogynidae

Family Neotylenchidae

Family Nothotylenchidae

Family Paratylenchidae
Family Pratylenchidae
Family Tylenchidae
Family Tylenchulidae
Family Aphelenchoidiae
Family Longidoridae
Family Trichodoridae Mollusca
Super family Planorbacea
Super family Achatinacea
Super family Arionacea
Super family Limacacea
Super family Helicacea
Super family Veronicellacea
Arthropoda
Super family Ascoidea
Super family Dermanyssoidea
Super family Erjophyoidea
Super family Tetranychoida
Super family Eupodoidea
Super family Tydeoidea
Super family Erythraenoidea
Super family Trombidioidea
Super family Hydryphantoidea
Super family Tarasonemoidea
Super family Pyemotoiidea
Super family Hemisarcoptoidea
Super family Acaroidea
Order Polydesmida Family
Sminthoridae
Family Forfieulidae
Order Isoptera

Order Thysanoptera

Family Acrididea

Family Gryllidae Family

Gryllacrididae Family

Gryllotalpidae Family

Phasmatidae Family

Ronalecidae Family Tettigoniidae

Family Tatragidae

Family Thaumastocoridae

Super family Piesmatoidea

Super family Lygaeoidea

Super family Idiostoloidea

Super family Careoidea

Super family Pentatomoidea

Super family Pyrrhocomroidea

Super family Tingoidea

Super family Miroidea Order Homoptera

Family Anobiidae

Family Apionidae

Family Anthribidae

Family Bostrichidae

Family Brentidae

Family Bruchidae

Family Buprestidae

Family Byturidae

Family Cantharidae

Family Carabidae

Family Ceambyceidae

Family Chrysomelidae

Family Coecinelidae

Family Curculionidae

Family Dermestidae
Family Elateridae
Family Hydrophilidae
Family Lyctidae
Family Meloidae
Family Moredellidae
Family Platypodidae

Family Scarabaeldae

Family Scolytidae
Family Selbytidae
Family Lepidoptera
Family Agromyzidae
Family Anthomiidae
Family Cecidomiidae
Family Chioropidae
Family Ephydriidae
Family Lonchaeidae
Family Muscidae
Family Otitidae
Family Syrphidae
Family Tephritidae
Family Tipulidae
Family Apidac
Family Caphidae
Family Chalcidae
Family Cynipidae
Family Eurytomidae
Family formicidae
Family Psilidae
Family Sircidae
Family Tenthredinidae

Family Torymidae

Family Xyloioipidae and also unclassified organisms and/or organisations whose classification is unknown and all other organisms associated with plant and insect diseases.