THE MANUFACTURE, USE, IMPORT, EXPORT AND STORAGE OF HAZARDOUS MICRO-ORGANISMS GENETICALLY ENGINEERED ORGANISMS OR CELLS RULES, 1989

MINISTRY OF ENVIRONMENT & FORESTS

NOTIFICATION

New Delhi, the 5th December, 1989

G.S.R. 1037(E).-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 genetechnology 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.**

[1](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 shall 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 hereof form part.

(3) These rules shall also apply to new genetechnologies 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;

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[1] Rules came into force w.e.f.1.10.1993 vide Notification S.O.677(E), dated 13.9.1993.

(b) exportation and importation of genetically engineered cells or organisms;

(c) production, manufacturing, processing, storage, import, drawing off, packaging and repacking 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) "microorganisms" shall include all the bacteria, viruses, fungi, mycoplasma, cells lines, algae, protodones and nematotes 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 aspect in respect of on-going research projects and activities involving genetically engineered organisms/hazardous microorganisms. 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 ongoing 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 of 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 microorganisms/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 having microorganisms/genetically engineered organisms shall prepare with the assistance of the Institutional Biosafety Committee (IBSC) an uptodate on-site emergency plan according to the manuals/guidelines of the RCGM and make available copies to the District Level Committee/State Biotechnology Co-ordinating 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 microorganisms 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 Wild life

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, 1986.

(5) State Biotechnology Co-ordination Committee (SBCC).

There shall be a State Biotechnology Coordination 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 microorganisms. The compositions of the Coordination 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

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 microorganisms 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 microorganisms, formulate information chart, find out hazards and risks associated with each of these installations and coordinate 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 MICROORGANISMS OR GENETICALLY ENGINEERED PRODUCT

(1) For the purpose of these rules, microorganisms 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 microorganisms, 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. ANIMAL PATHOGENS AND PLANT PESTS

Microorganisms 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 microorganisms of genetically engineered organisms/substances or cells except with the approval of the Genetic Engineering Approval Committee.

(2) Use of pathogenic microorganisms 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 microorganisms/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/ microogranisms 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 microorganism 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 microorganisms 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 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 and 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 eradicate the case, including

examinations according to specific directions and at specific laboratories. He shall also make available an on-site emergency plan to GEAC before obtaining the approval. If the authority makes examination itself, it may order the applicant to delay the expenses incurred by it in so doing.

(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 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 year 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 Coordination 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 Coordination 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.

(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 INTERRUPTIONS OR ACCIDENTS

(1) Any person who under rule 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 or health or involve any danger thereto.

(2) Any notice given under sub-rule (I) 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 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 microorganisms/ genetically engineered organisms under his control as the DLC may required 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 promises 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 Coordination 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

(l) 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 microorganism/genetically engineered organism from rule 7-11.

ANIMAL AND HUMAN PATHOGENS

SCHEDULE

BACTERIAL

Risk Group II

Acinetobacter calcoacetieus

Actinobacillus all species except A mallei, which in Risk Group III

Acromonoas hydrophila

Arzona hinshawii-all serotypes

Baciluss anthracis

Bordetella-all species

Borrelia recurrentis B. vincenti

Campylobacter fetus

Camphylobacter jejuni

Chalarmydia psittaci

Cheamydia trachomatis

Clostridium hauvoci, Cl, Difficle Cl. fallax, Clhaemolyticum Cl histolyticum, Cl, novyi, (Cl. perfringes), Cl. speticum, Cl. sordeili

Cornylebacterium diptheriae, C. equi, C. haemolyticum, C. pseudo tuberculosis, C. pyogenes, C. renale

Diplococcus (Streptococcus) pneumoniae

Edwardsiila tarda

Erysipelothix insidiosa

Escherichia Coli-all enteropathogenic serotypes enterotaxigenic

Haemophilus ducrevi, H. influenzae, H. pneumoniae

Herellea vaginicola

Klebsiella- all species and all serotypes

Legionlla 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. lepreae

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 serotypes

Shigella all species and all serotypes

Shpacrophorus necrophorus

Staphylococcus aureus

Straptobacillus moniformis

Streptococcus pneumoniae

Streptococcus pyogenes, S. equi

Streptomyces madurae, s. pelleteri, s. somaliensis

Treponema carateum, T. palidum and T. pertenue

Vibrio foctus, V. comma including biotype EI 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

Paseturella 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 prpinica)
Aspergilus fumigatus
Blastomyces dermatitis
Cryptococcus neoformans C. fersiminosos
Epidermophyton madurella, microsporon
Paracoccidiodes brasiliensis
Sporothrix
Trichoderma
Trichophyton

Risk Group III

Coccidioaes immitis Histoplasma capulatum
Histoplasma capsulalum var duboissl

PARASITIC

Risk Group II

Entanoeba histolytica
Leishmania species
Naegeleria gruberia
Plasmodium theilera, P. babesia P. falcoparum
Plasmodium babesia
Schistosoma
Toxoplasma gondii
Toxocara canis
Trichinella spiralis
Trichomanas
Trypanosoma cruzi

Risk Group III

Schisistosoma mansoni

VIRAL RICKETTSIAL AND CHAIMYDIAL

Risk Group II

Adenoviruses-Human, all types

Avian loukosis

Cache Valley virus

CELO (avain 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 Past 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.

Infections Bovine Rhinotraechitis virus (IBR).

Infections Bursal diesaes of poultry and Infectious Bronchitus

Infections Laryngotraechitis (ILT)

Influenza virus-all types, except A/PR8/34 which in Risk Group I

Langat virus Leucosis Complex

Lymphogranuloma venereum agent

Mark's Disease virus

Measles virus

Mumps virus

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

Parainfluenza viruses-all types except parainfluenza virus 3, SF4 strain, which is in Risk Group I

Polio viruses-all types wild and attenuated

Poxvirus-all typcs except Mastrim, monkey pox, sheep pox and white pox, which depending on experiments are in Risk Group III or IV.

Rabies virus-all strains except rabies stret virus, which should be classified in Risk Group III when inoculated into carnivores

Reoviruses-all types

Respiratory syncital virus

Rhinoviruses-all types

Rinderpest (other than vaccine strain in use)

Rubella virus

Stimian virues-all types except herpeavirus simae (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, 17 D vaccine strain

Risk Group III

African House Sickness (attenuated strain except animal passage)

Alastrim, monkey pox and whitepox, when used into vitro

Arboviruses-All strains except those in Risk Group II and IV

Blue tongue virus (only serotypes reported in India)

Ebola fever Virus

Epstiein-Barr virus

Feline Leukemia

Feline sarcoma

Foot and Mouth Disease virus (all seritypes and subtypes)

Gibbon Ape Lymphosarcoma

herpesvirus ateles

herpevirus saimiri

herpes Simplex 2

HIV-1 & HIV-2 and strains of SIV

Infcctious Equine Anaemia

Lymphocylic choriomeningitis virus (LCM)

Monkey pox, when used in vitro

Non-defective Adeno-2 SV-40 hybrids

Psettacosis-ornithosis-trachoma group of agents

Pseudorabies virus

Rabies street virus, when used inoculations of carnivores

Rickttsia-all species except Vole rickeitsia dn Coxiell burnetti when used for vector transmission or animal inoculatin experiments

Sheep pox (field strain)

Swine Fever virus

Vesiculat stomatitis virus

Woolly monkey Fibrosarcoamm

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 undefiened

Herpesvirus simlae (monkey B virus)

Tick-borne encephalitis virus complex, including-Russian Spring Summer Encephalifs, Kyasanur Forest Diseast, omsk hemorrhagic fever and Central European encephalitis viruses

SPECIAL CATEGORY

BACTERIAL

Contagious Equine Metritis (H. equinilais) Pestis-petit de ruminantium

VIRAL RICKETTSIAL AND CHLAMYDIAL:

African Horse Sickness virus (serotypes not reported in Indian 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 eizootics 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 viruses

All bacteria, fungal, algal, plant, insect and neumatode viruses; special care should be taken for-

(i) Geminiviruses,
(ii) Calulimoviruscs,
(iii) Nuclear Polyhedrosis viruses,
(iv) Grandulosis viruses, and
(v) Cyloplasmic polyhedrosis viruses

2. Bacteria

Family Pseudomonadaceae
Genus Pscudomonas
Genus Xanthomonas
Genus Azotobacter

Family Rhizobiaceae

Genus Rhizobium/Azorhizobium
Genus Bradyrhizobium
Genus Agrobacterium
Genus Phyllobacterium
Genus Erwinia
Genus Enterobacter
Genus Klebzieller

Family Spirollaceae

Genus Azospirillum
Genus Acqaspirillum
Genus Occeonospirillum
Family Slreplomycetaceae
Genus Streplomyces
Genus Nocardia

Family Actionmycetaceas

Genus Actinomyces

Coryneform Group

Genus Clavibacter
Genus Arthrobacter
Genus Curtobacterium
Gcnus Bdellovibro
Family Rickettsiaceae

Rickeltsial 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 Chlomphyceae

Family Euglenophyceae

Family Pyrophyceae

Family Chrysophaceae

Family Phacphyceae

Family Rhodophyceae

Fungi

Family Plasmodiophoraceae

Family Chytridiaceae

Family Oldipiopsidaceae

Family Synchytriaceae

Family Catenariaceae

Family Coelomomycetaceae

Family Saprologniaceae

Family Zoopagaceae

Family Albuginaceae

Family Peronosporaceae

Family Pythiaceae

Family Mucoraceae

Family Choanephoraceae

Family Mortierellaceae

Family Endogonaceae

Family Syneephalastraceae

Family Dimargaritaceae

Family Kickxellaceae

Family Saksenaeaceae

Family Entomophthoraceae

Family Ecerinaceae

Family Taphrinaceae

Family Endomycetaceae

Family Saceharamyeetacea

Family Eutotiaceae

Family Gymnoascaceae

Family Aseophaeriaceae

Family Onygenaceae

Family Microascaceae

Family Protomycetaceae

Family Elsinoeaceae

Family Myriaginaceae

Family Dothidiaceae

Family Chaetothyriaceae

Family Pharmularieaceae

Family Phillipsicllaceae

Family Gysteriaceae

Family Pleosporaceae

Family Melamomataceae

Family Ophiostomataceae

Family Aseosphaeriaceae

Family Erysiphaceae

Family Meliolaceae

Family Xylariaceae

Family Diaporthaceae

Family Hypoercaceae

Family Clavicipataceae

Family Phacidiaceae

Family Ascocorticiaceae

Family Hemiphacidiaceae

Family Dermataceae

Family Selerotimiaceae

Family Cyttariaceae

Family Helosiaceae

Family Sarocostomataceae

Family Sarcoscyphaceae

Family Auricolariaceae

Family Ceratobasidiaceae

Family Corticiaceae

Family Hymenochaetaceae

Family Echiondintiaceae

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 Labonlbeniaceae

Family Sphaeropsidaceae

Family Mclabconiaceae

Family Tuberculariaceae

Family Dermatiaceae

Family Moniliaceae

Family Aganomucetaceae

Parasitic Weeds

Family Balanophoraceae-parasitic species

Family Cuscutaceae-parasitic species

Family Thydonoraceae-parasilic 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 dest

Nematodes

Family Anguinidae

Family Belonolaimidae

Family caloosiidae

Family Cariconematidae

Family dolichodoridae

Family Fergusbbiidae

Family hemicycliophoridae

Family Heteroderidae

Family Hoplolaimidae

Family Mcloidogynidae

Family Neotylenchidae

Family Nothotylenchaidae

Family Paratlenchidae

Family Pratyenchidae

Family Tylenchidae

Family Tylenchulidae

Family Aphelenchoidae

Family Longdoridae

Family Trichodoridae

Mollusca

Super family Planorbacca

Super family Achatinacca

Super family Arionacca

Super family Limacacca

Super family Helicacea

Super family Veronicellacea

Arthropoda

Super family Ascoidea

Super family Dermanyssoidea

Super family Erjophyoidea

Super family Tetranychoidea

Super family Tetranychoidea

Super family Eupododca

Super family Tydcoidea

Super family Erythraenoidca

Super family Trombidioidea

Super family Hydryphantoidea

Super family Tarasonemoidea

Super family Pyemotoiodea

Super family Hcmisaracoptoidea

Super family Acaroidea

Order Polydesmida

Family Sminthoridao

Family Forficulidzo

Order Isptera

Order Thysanoptera

Family Acredidea

Family Gryllidae

Family Gryllacridiedae

Family Gryllotalpidae

Family Phasmatidao

Family Ronalcidao

Family Tettigoniidao

Family Tatragidao

Family Thaumastocoridae

Super family Piesmatoidca

Super family Lygacoidea

Super family Idiostoloidea

Super family Careoidea

Super family Penatomoidea

Super family Pyrrhoeomidea

Super family Tingoidea

Super family Miroidea

Order Homoplara

Family Anobiidae

Family Apionidae

Family Anthrididae

Family Bostrichidae

Family Brentidae

Family Bruchidae

Family Buprestodae

Family Byturidae

Family Cantharidae

Family Carabidae

Family Ceambiccidae

Family Chrysomelidae

Family Coecinellidae

Family Curculionidae

Family Dermestidae

Family Elateridae

Family Hydrophilidae

Family Lyctidae

Family Meloidae

Family Moredellidae

Family Platypodiadae

Family Scarabaeldae

Family Scolytidae

Family Selbytidae

Order Lepidoptera

Family Agromyidae

Family Anthomidae

Family Cecidomidae

Family Chioropidae

Family Ephydridae

Family Lonchacidae

Family Musicdae

Family Otitidae

Family Syrphidae

Family Tephritidae

Family Tipulidae

Family Apidae

Family Caphidae

Family Chalcidae

Family Cynipidae

Family Eurytomidae

Family formisidae

Family Psilidae

Family Sircidae

Family Tenthredinidae

Family Torymidae

Family Xyloiopidae

and

also unclassified organism and/or organisms whose classification is unknown, and all other organisms associated with plant and insect disease.

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