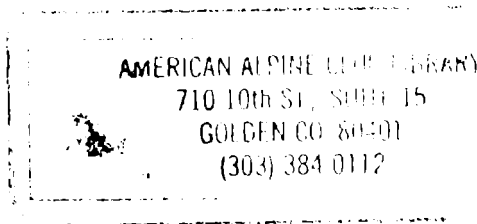


# FUNGI OF JAMMU, KASHMIR & LADAKH

G.N. QASBA AND A.M. SHAH

**Foreword**  
**Prof. A. Ahmad**



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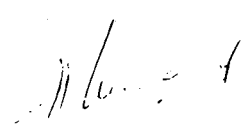
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## Foreword

Fungi and men exist in an interesting love-hate association as friends and as foes. Any information on these curious creatures of evolution is bound to be important. In Jammu & Kashmir, fungi have evolved under diverse macro and micro climatic situations and have a vital relevance to all pursuits of sustenance. The compilation of information on fungal flora of Jammu, Kashmir and Ladakh is therefore a timely and commendable job done by Dr. G.N. Qasba and DR. A.M. Shah. The good effort of the authors is sure to win them the admiration of scientists' community. I hope that the book will be an useful aid as reference material to students, teachers and researchers. It is expected that the authors will continue to update the compilation from time to time.

SKUAST,  
Camp Office, Jammu  
April 12, 1990



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February 12, 1991.



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# INTRODUCTION

The Jammu, Kashmir and Ladakh represent an interesting and diverse habitat of rich and heterogenous life forms. These three regions surrounded by North Western Himalayas in Jammu and Kashmir form a transition region of diverse physical features as well. On the basis of altitude (ranges between 215-7012 metres above mean sea level) and climate, the entire region is represented by four zones, i.e., sub-tropical zone (Jammu region), Intermediate zone (Poonch, Rajouri & Doda), temperate zone (Kashmir valley) and cold arid zone (Kargil, Leh and Gilgat)

## **Fungi of Jammu, Kashmlr & Ladakh**

The book includes list of fungal species (in alphabetical order) recorded from time to time from Jammu, Kashmir and Ladakh regions mostly on plant species growing under nature (wild) and manmade habitats (Agriculture, Horticultural and Floriculture). The most of the fungal species reported in the book cause diseases of varying incidence, besides quite a good number of these live as Saprobies or in Symbiosis<sup>r</sup> with other plant species. The information on fungi recorded from Jammu, Kashmir and Ladakh was scattered in various scientific journals, books and other reference materials (most of which are out of print). The authors have attempted to present this voluminous and useful information under one cover. The book presents following sections:

Section I List of fungal species in alphabetical order, with brief taxonomic information (i.e. class, order and family). Besides information is also provided with regard to host/habitat and place of occurrence along with reference number which could lead the

reader to original/detailed publication (Ref. Section III).

**Section II** Presents the host/habitat index.

**Section III** Detailed references, referred in the Section I, with a particular number against a given fungal species:

**Section IV** Brief description of Technical terms used in study of fungi/plant pathology (Glossary)

**Section V** List of important Journals (Mycology/plant pathology).

The information contained in this book would be useful to experts in Agriculture, Horticulture, Floriculture and Forestry in particular to mycologists and plant pathologists. Authors would welcome suggestions and criticism for improvement in the future editions of the book.



# List of hosts and substrata

## 1. *Achorion* Remak., Deutro., Moniliales.

- A. actoni* Dey and Maplestone, Skin of Man, Kashmir.<sup>45</sup>  
*A. sehoenlcini* (Leb.) Remak. Skin of Man, Kashmir.<sup>45</sup>

## 2. *Acrodictys* Ellis, Deutro., Moniliales

*A. dennisii* Ellis, Dead herbaceous stem, Kangan, Kashmir.<sup>107</sup>

## 3. *Aecidium* pers. Basidio, Uredinales

*A. infrequens* Berclay. Leaves of *Geranium nepalesis*, Harwan, Kashmir.<sup>187</sup>

*A. montanum* Butler. *Berberis* sp., Kashmir; *B. zobetiana*, Gilgat Road, Kashmir.<sup>40</sup>

*A. myriactidis* (Berclay) Syd. Leaves of *Myricatus nepalensis* Harwan, Kashmir.<sup>13</sup>

*A. ranunculacearum* DC. *Ranunculus hirtellus*, Deosai plains, Kashmir.<sup>40</sup>

*A. stewartianum* Cummins. *Heracleum candicans*, near Taubat, Kishenganga Valley, Kashmir.<sup>40</sup>

## 4. *Agricus* L. ex. Fr., Basidio. Agricales

*A. campestris* L. ex. Fr. soil, Jammu<sup>119</sup>

## 5. *Albugo* Pers. ex. S.F. Gray, Phyco., Peronosporales

*A. bliti* (Biv) Kuntz (*Cystopus bliti* (Biv) de Bax). Leaves of *Amaranthus blitum*. Kashmir<sup>22</sup>

*A. candida* (pers.) Kuntz (= *Cystopus candidus* (Pers.) Lev.<sup>148</sup>  
Leaves and Stems of *Brassica campestris* L., Kashmir.<sup>23</sup>  
*Eruca sativa* Mill., Srinagar.<sup>22</sup>

*A. ipomoeae-panduratae* (Schw.) Swingle. 152 *Ipomoea ericarpa* Achabal, *I. hederacea*, Jammu.<sup>118</sup>

*A. portulacae* (DC) Kuntz, (= *Cystopus portulacae* (DC) Lev.<sup>22</sup>). Leaf of *Portulaca oleracea*, Srinagar.

*A. tragopogonis* (DC). S.F. Gray<sup>152</sup> (= *Cystopus tragopogonis* (Pers.) Schroet<sup>22</sup>. Leaves of *Serratula pallida* DC. Harwan.

#### 6. *Alternaria* Nees ex. Wallr., Deutro., Moniliales

*A. alternata* (Fr.) Keissler (= *Alternaria tenuis* Nees) on *Datura innoxia* Jammu.<sup>15</sup> On *Fagopyrum tataricum* Gaertn, Jammu.

*A. carthami* (Chowdhury 31). leaves of *Carthamus tinctorius*., Srinagar.<sup>15</sup>

*A. crassa* (Sacc) Rands *Datura metal* L. Jammu.<sup>50</sup>

*A. ellissii* Pandotra & Ganguly. Leaves of *Jasminum auriculatum*, Jammu.<sup>123</sup>

*A. eriobotryae* sechet., Living leaves of *Eriobotrya japonica* Lindl.

*A. radieina* Meyer, Drechster and Eddy. Seeds of *Dacus carota*, Jammu.

*A. solani* (Ellis & Mart.) Leaves of *Solanum tuberosum*: L. Burzalla, Kashmir.<sup>124</sup> Srinagar<sup>71</sup>. Living leaves of *Hyoscramus niger* L. Burzulla, Kashmir.<sup>124</sup>

*A. tenuis* Auct. On fruit of Pear and Tomato, Srinagar,<sup>146</sup>. leaves and buds of *Rouwolfia serpentina* Benth. & Kuntz., Jammu 49; Seeds of *Dacus carota*, Jammu.<sup>143</sup>

*A. tenuissima* (Nees ex Fr.). Wiltshire, Leaves of *Atropa belladonna*. L., Yarikah- Kashmir and Jammu.<sup>50</sup>. Living leaves of *Datura stromonium* L., Jammu.<sup>49</sup> Living leaves of *Morus delichos* Lablab L., Jammu.,<sup>119</sup>. Living leaves of *Morus alba*, Jammu.<sup>119</sup>. Living leaves of *Pergularia daemia* (Forsk) Chior. Jammu.<sup>49</sup>

*Alternaria* spp. Leaves of *Datura innoxia* Mill., Jammu & Kashmir.<sup>49, 62</sup> seeds of *Anethum graveolens* L., Jammu.<sup>50</sup>

#### 7. *Amohinema* Karst., Basidio., Polyporales.

*A. byssoides* (pers. ex. Fr.) J. Erikss. On *Cedrus deodra* Loud., Gulmarg.<sup>183</sup>

#### 8. *Ascochyta* Lib., Deutro., Sphacropsidales

*A. atropae* Bres. Living leaves of *Atropa acuminata* Royle; ex Lindly., Yarikah, Kashmir.<sup>49</sup>

- A. colebrookiae* Pandotra & Ganguly. On living leaves of *Colebrookia opositifolia* Sm. Riasi, Jammu. <sup>123</sup>
- A. gossypii* Syd. Leaves of *Gossypium* sp., Kashmir. <sup>159</sup>
- A. pergulariae* Pandotra and Sasstry leaves of *Pergularia pallida* W. & A., Jammu. <sup>129</sup>
- A. phaseolorum* Secc. Leaves of *Phaseolus vulgaris*, Kashmir. <sup>159</sup>
- A. sambuci* Pandotra and Sasstry Leaves of *Sambucus ebulus*, L. Phalgam Kashmir <sup>128</sup>
9. **Asgergillus spp. Asco. Seeds of Anethum qavedolim L., Jammu.** <sup>62</sup>
10. **Asterostroma Masee., Basidio., Agaricales**  
*A. musicolum* (Berk. & Curr. ) Masee. On a logs of *Abies pindrow*, Bhadarwah, Jammu <sup>186</sup>
11. **Auricularia Bull. ex Merat, Basidio., Tremellales.**  
*A. auricula* (Hook.) on trunks etc., Sonamarg. Kashmir. <sup>22</sup>  
*A. mesentrica* (Dus.) Fr. Dead branches of *Tectona grandis*, Phalagam Kashmir <sup>119</sup>
12. **Auriscalopium Gray., Basidio., Aphylophorales.**  
*A. vulgare* S.F. Gray, Moist female cone of *Pinus wallichiana*, Sansar Kashmir <sup>180</sup>
13. **Bipolaris Shoem. Deutro., Moniliales.**  
*B. spicifera* (Bain.) Subram. On living leaves of *Juglana regia* L. Srinagar. <sup>153</sup>
14. **Bovita Pers., Besides., Lycoperdales.**  
*B. lycoperdioides* (Cooke Pers ( = *Bovistella lycoperoides* (Cooke) L.  
*Scleroderma cookei* de Toni 22 On moss, Sonamarg. Kashmir <sup>2, 22</sup>
15. **Bremia Regal, Phyco., Personosporales.**  
*B. lactucae* Regal ( = *Bremia gunglioniformis* (Casp) Shaw <sup>155</sup>).

leaves of *Sonchus oleraceus* L. Chakrohi, Jammu. <sup>22</sup>;  
*Lactuca scariola* Kashmir. <sup>194</sup>

16. **Caloscypha Boud., Asco., Pezizales.**

*C. fulgens* (Pers., ex Fr.) Bound. Humicolous soil in  
 Coniferous forest, Kokarnag, Anantnag, Phalgam. Kashmir <sup>191</sup>

17. **Calvatia Fr. Basidio., Lycoperdales.**

*C. gigantea* (Batsch. ex pers) Llyod ( = *Lycoperdon  
 gigantum* Batsch. ex Pers. 22) On ground Sonamarg  
 Kashmir.

*C. saccata* (Vahl ex Fr.) Worg. ( = *Lycoperdon saccatum  
 Vahl* 22). Ground Baramula Kashmir. <sup>3</sup>

18. **Comarosporium Schuiz., Deutro.,  
 Sphaeropsidales.**

*C. curotiae* Whemeyer. *Euritia ceratoides* C.A. May,  
 Kashmir. <sup>194</sup>

19. **Capnodium Mont., Asco., Dothidiales.**

*C. pini* Berk. & Curt. *Pinus excelsa*. <sup>22</sup>

20. **Cercospora Fres. Deutro., Moniliales.**

*C. apii* Fr. var *Carotae* Pass. leaves of *Daucus carota*  
 Srinagar, Kashmir. <sup>115</sup>

*C. barlericola* Payak and Thirum. Leaves of *Barleria cristata*  
 L. Jammu <sup>124</sup>

*C. calotropidis* Ell. & Ev. Leaves of *Calotropis gigantea* R.  
 Br., Jammu. <sup>123</sup>

*C. canescens* Ell. & Mart. Leaves of *Ocimum basilicum* L.,  
 Jammu. <sup>122</sup>

*C. cardiminex*, Losa Espano. Leaves of *Cardamine impatiens*,  
 Srinagar, Kashmir. <sup>147</sup>

*C. cavarae* Sacc., P. & D. Leaves of *Glycyrrhiza galbra* L.,  
 Jammu. <sup>50</sup>

*C. cauenta* Sacc. Leaves of *Phaseolus mungo* var. *radialis* L.,  
 Gilgat, Kashmir. <sup>161</sup>

*C. cryptolepidis* Pandotra. Living leaves of *Cryptolepis buchanani* Roen. Salal, Kashmir.<sup>123</sup>

*C. dioscoreae* Ellis and Mart. Leaves of *Dioscorea* spp. Harwan, Kashmir<sup>161</sup>; of *D. delbidea* Wall, Pulwama, Kashmir.<sup>50</sup>

*C. emodi* Pandotra and Sastry. Leaves of *Podophyllum emodi*, Srinagar, Kashmir.<sup>88</sup>

*C. fagopyvri* Chupp. and Muller. Leaves of *Fagopyrum esculantum* Moench, Jammu.<sup>123</sup>

*C. foeniculi* Magn. Leaves, peduncles and stems of *Foeniculum vulgare* Mill, Harwan, Kashmir.<sup>162</sup>

*C. furfurella* Spig. Leaf of *Borrhaavia diffusa* L., Jammu<sup>124</sup>

*C. hamiltoniae* Munjal, Lal and Chena. Leaves of *Hamiltonia suaveolens* Roxb., Jammu.<sup>50</sup>

*C. holmakioldiae* Lall and Gill. Living leaves of *Holmskioldia sanguinea* Retz. Jammu.<sup>119</sup>

*C. lammensis* Pandotra. Leaves of *Populus nigra* L., Jammu.<sup>120</sup>

*C. Jasminicola* Mueller & Chupp. Leaves of *Jasminum officinale* L., Jammu.<sup>50</sup>

*C. krugiana* Muller and Chupp. Leaves of *Bachmeria nivea* Gaud., Jammu.<sup>123</sup>

*C. podophylli* Tehon and Daniels. Living leaves of *Podophyllum emodi* Wall. Yarikhah, Tangmarg, Kashmir.<sup>114</sup>

*C. punjabensis* Syd. Leaves of *Vallisneria spiralis*, Jammu.<sup>50</sup>

*C. rosicola* Pass. Leaves of *Rosa* spp., Srinagar, Kashmir.<sup>23</sup>

*C. rubi* Sacc. Leaves of *Rubus* spp., Verinag, Kashmir.<sup>161</sup>

*C. rubrotincta* Eill & Ev. Leaves of *Prunus amygdalus* Baill., Srinagar.<sup>27</sup>

*P. avium* L. (Sweet Cherry), Kashmir.<sup>76</sup>

*C. serpentina* Pandotra and Hussain. Leaves of *Rauwolfia serpentina* Benth., Jammu,<sup>124</sup>

*C. smilacis* Thuem., Leaves of *Smilax aspera* L., Salal, Jammu.<sup>124</sup>

*C. stachytarphetae* Ell & Ev. Leaves of *Stachytarpheta Jamaicensis* Vah., Jammu.<sup>123</sup>

*C. subsessilis* Syd. Leaves of *Melia awadirach*, Jammu.<sup>123, 124</sup>

*C. tetrastigmatis* Pandotra and Gangully. Leaves of *Terastigma salcatum* Gamble., Jammu.<sup>122</sup>

*C. tinosporae* H. & P. Syd. Leaves of *Tinospora cardifolia* Miers. Jammu.<sup>123</sup>

*C. violae* Sacc. Leaves of *Viola partrimi* Ging., Phalgam; Kashmir.<sup>123</sup>

*C. viticola* (Ces.) Sacc, Leaves of *vitis vinefera*, Achabal, Kashmir.<sup>161</sup>

*C. withaniae* H. & P. Syd. Leaves of *Withania sominefera* Dunal, Jammu.<sup>123</sup>

## 21. **Chrysosporium** Corda. Deutro., Moniliales.

*C. Keratinophilum* (Frey) Carmichael. Soils from the banks of water courses in Srinagar, Kashmir.<sup>51</sup>

*C. tropicum* Carmichael. Rice field soil in Srinagar Kashmir.<sup>51</sup>

## 22. **Cicinnobolus** Ehrenb., Deutro., Spheropsidales.

*C. cesatis* de Bary. Living leaves of *Taraxicum officinale* Wager, parasitizing *Sphaerotheca fuligina* (Schlech) Poll, Jammu.<sup>119</sup>

## 23. **Cintractia** Cornu., Basidio., Ustilaginales.

*C. caricis* (Pers.) Magn. Ovaries of *Carex cardiolepis*, Sonamarg, Kashmir; *c. stenophylla*, Drass, Kashmir.<sup>103</sup>

*C. disciformes* Liro Ovaries of *Carex haematostoma*, Sonamarg, Kashmir.<sup>103</sup>

*C. elyinae* Syd., Ovaries of *Kobresia capilifolia*, Burzila Chowk, Kashmir.<sup>103</sup>

*C. Kobresiae* Mundk. Ovaries of *Kobresia laxa*, Satpura, Nulla, Kashmir.<sup>100, 103</sup>

24. **Circinotrichum** Nees. ex. Pers. Dead leaves of **Pyrus malus. (Malus domestica) Srinagar, Kashmir.**<sup>111</sup>  
*C. obscurus* (Corda) Hughes. Dead leaves of *Pyrus malus*, Srinagar, Kashmir.<sup>101</sup>
25. **Cladosporium** rink. ex. Fr., Deutro., Moniliales.  
*C. martianoffinum* Thuem. Leaves of *Populus alba* Sopore, Kashmir.<sup>1</sup>  
*C. spp.* *Chrysanthemum cinerarifolium* vis and *Anethum graveolens* L., Jammu.<sup>62</sup>; *Abelmoschus esculentus*, Jammu.<sup>171</sup>
26. **Clasterosporium** Scgw., Deutro., Moniliales.  
*C. carpophilum* (Lev.) Adesh (*Prunus amygdalus* Baill Almond, apricot (*Prunus amenica* L.) and Peach (*Punus persica* L.), Srinagr, Kashmir.<sup>110</sup>
27. **Clathrospora** Rabenh., Ascomycetes, Spheriales.  
*C. bakeri* Wehmeyer. *Kobresia achoenoides* (Me) Stend, K. nitens Clarke, Kashmir.<sup>199</sup>
28. **Clavaria** Vaill ex Fr., Basidio., Agricales.  
*C. lacquemontii* Lev., Ground, Kashmir.<sup>81,82</sup>  
*c. muscoides* = *C. comiculata* Schaeff,<sup>22</sup> Sonamarg, Kashmir.<sup>34</sup>
29. **Clavulinopsis** Van. Overeem., Basidio., Agricales.  
*C. comiculata* (Fr.) Corner<sup>39</sup> = *Calvaria comiculato* Schaeff.<sup>22</sup> Sonamarg, Kashmir<sup>26</sup>
30. **Coleosporium** Lev., Basidio., Uredinales.  
*C. barclayense* Bagchee. *Pinus excelsa* Wall., Kashmir.<sup>127</sup>  
*C. camounulae* (Pers.) Lev. Needle of *Pinus longifolia* Roxb, Jammu.<sup>122</sup>  
Leaves of *Campanula colorata*, Harwan, Kashmir.<sup>22</sup>  
*C. clematidiis* Barcl. Leaves of *Clematis montana*, Harwan, Kashmir.<sup>16</sup>  
*C. datiscae* Tranz. Leaves of *Datisca cannabina*, Harwan, Kashmir.<sup>160</sup>

31. **Colletotrichum Corda, Deutro., Moniliales.**

*C. capsici* (Syd.) Butler & Bisby. On *Boerhaavia diffusa*, Jammu.<sup>123</sup>

*C. dematium* (Pers. ex. Fr.) Grove. Leaves of *Dolichos lablab* L., Jammu.<sup>119</sup>

*C. destructum* O. Gara. Leaves of *Cocculus pendulus* (Forsk.) Diels., Jammu.<sup>124</sup>

*C. gloesporoides* Penz. *Prunus armeniaca* L., Srinagar.<sup>63</sup>

*C. graminicola* (Ces.) Wilson. Leaves of *Cymbopogon flexuosus* (Nees. ex Stend) Watz. Jammu.<sup>173</sup>

*C. inamdarii* Lall and Singh. Leaves of *Caecissa opaca* Salaf., Jammu.<sup>50</sup>

*C. truncatum* (Schw). Andres. ex Moore. Living leaves of *Cocculus pendulus* (Forsk), Diels., Jammu.<sup>124</sup>

32. **Coniothecium Corda, Deutro., Moniliales.**

*C. chomatosporium* Gorda. Twigs and fruits of *Pyrus malus*, Srinagar, Kashmir.<sup>115</sup>

33. **Coniothyrium Corda., Deutro., Sphareroptidales.**

*C. albae* Pandotra and Hussain. Living leaves of *Morus alba*. Jammu.<sup>124</sup>

*C. olivaceum* Bon. Dead branches of *Pyrus malus* Sopore.<sup>115</sup>

*C. pyrinum* (Sacc.) Sheldon. On leaves of apple, Srinagar.<sup>142</sup>

34. **Corticium Pers. ex Fr., Basiodio., Agricales.**

*C. solani* (Berk.) Kuntz. Root and foot rot of *Datura innoxia* Mill., Jammu.<sup>170</sup>

35. **Corynespora Gussow., Deutro., Moniliales.**

*C. cassicola* (Berk. & Curt.) Wei. *Rauwolfia serpentina* Benth., Jammu.<sup>121</sup>

*C. smithii* (Berk & Br.) Ell. Dead Twigs, Jammu, Anantnag, Kashmir.<sup>164</sup>



36. **Cryptocoryneum Fuckel, Deutro., Moniliales.**  
*C. condensatum* (wallr.) Hughes & Mason. Dead wood, Phalgam, Kashmir.<sup>107</sup>
37. **Ctenomyces Eidem., Ascomycetes, Eurotiales**  
*C. serratus* Eid., Soil, Srinagar, Kashmir.<sup>44</sup>
38. **Curvularia Baedijr., Deutro., Moniliales.**  
*C. lunata* (Wakker) Boedijn). On *Coculus pendulus* (Forsk.) Diel, and *Ipomoea coccinia* L., Jammu.<sup>124</sup>, Leaves of *Mentha arvensis* var. *piperascens*, Jammu.<sup>175</sup>
39. **Cylindrocladium Morgan, Deutro., Moniliales.**  
*C. scoparium* Morg. Leaves of *Eucalyptus macerthuri* Deane and Miden, Jammu.<sup>125</sup>
40. **Cylindrosporium Grev., Deutro., Melanconiales.**  
*C. oxycanthiae* (Kuntz & schm.) Died. Leaves of *Cretagus* sp., Harwan, Kashmir.<sup>167</sup>
41. **Cytospora Ehrenb. ex Fr., Deutro., Spheriopsidiales**  
*C. utra* (Bon) Sacc. Branches of *Morus alba*, Harwan, Kashmir.<sup>56,167</sup>  
*C. chrysosperma* Pers. ex Fr., Branches of *Populus ciliata*, Harwan, Kashmir.<sup>56, 167</sup>  
*C. salicis* (Corda) Rabenh. Branches of *Salix alba*, Achabal, Kashmir.<sup>56, 167</sup>
42. **Daldinia Ces. and de Not., Ascomy., Sphaeriales**  
*D. concentrica* (Bolt. ex Fr.) Ces & de Not. Rotten wood, Aru, Kashmir.<sup>118</sup>
43. **Dilophospora Desm., Deutro., Spheropsidiales.**  
*D. alopecuri* (Fr.) Fr. Leaves of wheat, Chogal, Handwara, Kashmir Valley.<sup>108</sup>
44. **Denemasporium Lev., Deutro., Spheropsidiales.**  
*D. gramineum* (Berk.) Lev. *Cynodon dactylon* Pers., Kashmir.<sup>200</sup>

45. **Diplocarpon Wolf., Ascomy., Helotiales.**

*D. rosae* Wolf. Leaves of *Rosa* sps., Jammu.<sup>123</sup>

46. **Diplodia Fr., Deutro., Spheropsidiales.**

*D. atrobrunnea* Wehmeyer. *Campanula* sp. Kashmir.<sup>200</sup>

*D. butleri* Syd. Dead branches of *Morus alba*, Harwan, Kashmir.<sup>167</sup>

*D. eitricii* Wehmeyer. *Eritrichum strictum* DC., Kashmir, Ladakh.<sup>200</sup>

*D. heterospora* Wehmeyer. Leaves of *Hedra nepalensis* Koch., Kashmir.<sup>200</sup>

*D. luteo-brunnea* Wehmeyer. *Companula* sps., Kashmir.<sup>200</sup>

*D. thesii* Wehmeyer. *Thesium himalayensis* Royle, Zanaskar, Ladakh.<sup>200</sup>

47. **Diplodina Westend., Deutro., Spheropsidiales.**

*D. butleri* Died. leaves of *Stipa* sp., Harwan, Kashmir.<sup>167</sup>

48. **Discina (Fr.) Fr., Ascomy., Pezizales.**

*D. perluta* (Fr.) Fr., Moist soil in Coniferous forest, Batote, Udhampur, Jammu.<sup>191</sup>

49. **Discosia Lib., Deutro., Spheropsidiales.**

*D. artocreas* (Toda. ex. Fr.) Fr. Dead or fallen leaves of *Pyrus communis*, Srinagar, Kashmir.<sup>29</sup>

50. **Doassansia., Cornu., Sasidio., Ustilaginales.**

*D. alismatis* (Nees.) Cornu. Leaves of *Alisma palantago*, Achabal, Kashmir.<sup>103</sup>

51. **Doassansiopsis (Setch) Diet., Basidio., Ustilaginales.**

*D. martienoffiana* (Thieum) Diet. = *Doassansia martianoffiana* (Thieum) Schroet.<sup>22</sup> Floating leaves of *Potamogeton* sp., Wular Lake, Kashmir.<sup>103</sup>

52. **Endophyllum Lev., Basidio., Uredinales**

*E. tuberculatum* (Ellis & Kellerman) Arth. and Fromma. On *Lavatera Kashmiriana*, below Minimarg, Kishenganga Valley, Kashmir.<sup>9, 40</sup>

53. **Entomosporium Lev., Deutro., Melanconiales.**

*E. maculatum* Lev. Living leaves of *Pyrus communis*, Kashmir; Of *Pyrus pashia* and *Cydonia vulgaris*, Achabal, Kashmir.<sup>167</sup>

54. **Epichloe (Fr.) Tul., Ascomy., Clavicipetales.**

*E. typhina* (Pers.) Tul. *Stipa* sp. Harwan, Kashmir.<sup>22</sup>

55. **Erysiphe Nedw. f. ex Fr., Ascomy., Erysiphales.**

*E. cichoracearum* DC. On *Galium vernum*, Harwan, Kashmir; *Plantago-brachyphylla*, Srinagar, Kashmir; *P. major*, Harwan; fruits of *Chenopodium ambrosoides* var. *antheminticum* Grev., Kashmir, Leaves of *Mentha arvensis* J. & K. <sup>(49. 50)</sup>; *Helianthus annuus* *Papver somniferum*, Kashmir.<sup>103</sup>; Leaves of *Mentha arvensis* L. and *M. piperata* L., Jammu.<sup>154</sup> Living leaves and Stems of *Hysalis peruvianum* L., Srinagar,<sup>87</sup> of *Sussurea* spp., Ladakh.<sup>80</sup>

*E. communis* (Wallr.) Link. Leaves and Stems of *Lepidium densiflorum* Schard., Sopore, Kashmir.<sup>198</sup> recorded earlier under *E. chicoracearum* DC.<sup>22</sup>

Leaves of *Astragalus* sp. and *rumex* sp., Ladakh, and living leaves of *Alliaria officinalis* Andraz., Kashmir.<sup>78</sup>

*E. convolvuli* D.C. Leaves of *Convolvulus arvensis* L., Shadipur, Kashmir.<sup>55</sup>

*E. galeopsidis* D.C. *Phlomis stewartii*, Verinag, Kashmir<sup>22</sup>, *Stachya-sylvatica* L., Yusmarg, Kashmir.<sup>132</sup>

*E. graminis* D.C. On *Stipes siberica*, Verinag, Kashmir<sup>121</sup>; Leaves of *Poa* sp. Srinagar.<sup>54</sup>

*E. heraclei* (D.C.) St. Am. Living leaves of apple, Srinagar.<sup>142</sup>

*E. polygoni* D.C. On *Berberis* spp, Achabal, Verinag, *Eryngium billardieri*, Harwan, *Ipomoea* sp. Uri; *Lespedeza bicolor* Harwan, *Pisum sativum* Verinag, *Polygonum aviculare* Harwan, *Rumex nepalensis* and *R. orientalis* Harwan, *Thalctrium minus* Harwan, *chenopodium ambrosoides* Srinagar,<sup>198</sup>; *Eschscholtzia cristata* Wall., Bisaram, Phalgam<sup>127</sup>, Living leaves of *Polygonum aviculare* L., Harwan<sup>78</sup>, Living leaves & flowers of *Conium maculatum* Srinagar, Kashmir.<sup>146</sup>

- E. renunculi* Greville. Leaves, Stems and floral stalks of *Sambucus vubulus* L., Phalgam Kashmir.<sup>139</sup>
- E., trifolii* Grev. Living leaves of *Robinia pseudoacacia* L., Harwan Kashmir.<sup>87</sup>
56. **Exosporium Link. ex Wallr.**  
 (= **Helminthosporium Link.**), **Deutro., Moniliales**  
*E. extensum* (Petch.) var. *indica* Munjal and Kulshreshtha. Dead wood, Jammu.<sup>109</sup>
57. **Fomes (Fr.) Kickx., Basidio., Polyporales.**  
*F. unguatus* (Schaeff.) Sacc. Sonamarg, Kashmir.<sup>113</sup>
58. **Fusarium Link, ex Fr., Deutro., Moniliales.**  
*F. oxysporum* f. *rawolfii* Janardhanan, Ganguly and Hussain. On *Rauwolfia serpentina* Benth., Jammu.<sup>63</sup>  
*F. solani* (Mart.) App & Wollenw (= *F. viride* (Lechm.) Wollenw.<sup>96</sup>) (= *E. Solani* var. *medium* Wollenw (95)) ON *Chrysanthemum cinerariaefolium* (Trev). Boce., Kashmir Valley<sup>172</sup>; *Kochia trichophila*. Jammu.<sup>176</sup>  
*F. udum* Butler. On *Crotalaria verrucosa*, Jammu.<sup>169</sup>  
*Fusarium* sp. *Rowolfia serpentina* Benth., ec Kurtz. Jammu<sup>49</sup>.
59. **Glomeralla Schrenk. & Spel., Ascomy., Sphaeriales.**  
*G. cingulata* (Stonem.) Spauld. & Schrenk. Living leaves of *Jasminium officinale*, Jammu<sup>64</sup>; of *Pergularia daemia* (Forsk.) Chiv., Jammu.,<sup>124</sup> of *Ocimum basilicum* var. *purpureascens*, Jammu.<sup>177</sup>
60. **Gnomonia Ces. & de Not., Ascomy., Sphaerialles**  
*G. leptostyla* (Fr.) Ces & de Not. Causing leaf blotch disease on leaves of Walnut trees, Kashmir Valley.<sup>77</sup>
61. **Gymnosporangium Hedw. f., Basiodio., Uredinales.**  
*G. confusum* Plowr. On *Cretagus oxycantha*, Rupal Nullah, Badwan, Kishenganga Valley, Kashmir,<sup>40</sup>.

- G. distortum* Arth. & Cummins. Leaves and twigs of *Cotoneaster-bacillaris*, Tragbal, Kashmir.<sup>10</sup>
62. **Gyrophragium** Mont., Basidio.,  
**Hymenogastrales.**  
*G. delilei* Mont. Sonamarg, Kashmir.<sup>113</sup>
63. **Helicosporium** Nees. ex Fr., Deutro., Moniliales.  
*H. lumoricoides* Sacc. Dead twigs, Srinagar, Kashmir.<sup>105</sup>
64. **Helicotrichum** Nees & Nees., Deutro.,  
**Moniliales.**  
*H. obscurum* (Corda) Sacc. Dead leaves of *Pyrus malus* L., Srinagar, Kashmir.<sup>29</sup>
65. **Helminthosporium** Link. ex Fr. Deutro.,  
**Moniliales.**  
*H. turcicum* Pass. Leaves and Inflorescence of *Zea mays* L., Srinagar, Kashmir.<sup>71</sup>
66. **Helotium** Toda ex Leman, Ascomy., Helotiales.  
*H. lutescens* (Hedw. ex Fr.) Senu Bresdola. Dead megasporophylls of *Cedrus deodra* Laud., Batote and Bhadarwah, Kashmir.<sup>189</sup>
67. **Helvella** L., ex St. Amans, Ascomy., Pezizales.  
*H. crispa* (Scop.) Fr. Ground, Achabal, Kashmir.<sup>85</sup>
68. **Hendersonia** Sacc., Deutro., Spheropsidiales.  
*H. astragali* Karst. *Astragalus olipites*, Kashmir.<sup>200</sup>  
*H. heraclei* Sacc. Living leaves and stems of *Heracleum* sp., Harwan, Kashmir.<sup>167</sup>
69. **Heterosporium** Kalotzsch, ex Cookka., Deutro.,  
**Moniliales.**  
*H. allii-cepae* Ranojevi Causing blight of leaf and stem of *Allium cepa* L., Shalimar, Srinagar, Kashmir.<sup>73</sup>  
*H. variabile* Cooke. Leaves of *Spinacea oleracea*, Srinagar.<sup>115</sup>

70. **Hydnellum Karst., Basidio., Agricales.**  
*H. auratile* (Brits.) Mass, g. Soil under mixed forest, Bhadarwah, Jammu.<sup>181</sup>
71. **Hydnum L., ex Fr., Basidio., Agaricales.**  
*H. aitchesoni* Berk. Gulmarg, Kashmir.<sup>15</sup> (Ver. name "Ryle gub")
72. **Hypoderma Wallr., Basidio., Agaricales.**  
*H. pubera* (Fr.) Wallr. Rotten wood of gymnosperm and angiosperms.<sup>184</sup>  
*H. setigerum* (Pers.) Dank. Wook of Conifers, Phalgam, Kashmir.<sup>184</sup>
73. **Iamprospora de Not., Ascomy., Pezizales.**  
*L. crehqueranthi* (Cronan) Boud. var. *macrantha* Boud. Wet clay soil along a streamlet, Gulmarg, Kashmir.<sup>191</sup>
74. **Lasiobotrys Kunze. ex Fr., Ascomy., Erysiphales.**  
*L. butleri* Theiss. and Syd. Branches and leaves of *Lonicera* sp., Harwan, Kashmir.<sup>165</sup>
75. **Lentinus Fr., Basidio., Agaricales.**  
*L. lecometi*. Fr. Wood, Gulmarg, Kashmir.<sup>137</sup>  
*L. strigosus* Fr. on *Shorea robusta* Sonamarg, Kashmir.<sup>113</sup>
76. **Leptothyrium Kunze ex Wallr., Deutro., Spheropsidiales.**  
*L. pomi* (Mont & Fr.) Fruits of *Malus domestica* Fly speck disease, Srinagar, Kashmir.<sup>71</sup>
77. **Levesilula Arnaud., Ascomy., Erysiphales.**  
*L. taurica* (Lev.) Arnaud (= *Oidiopsis taurica* (Lev.) Salm.) causing Podery mildew of *Rauwolfia serpentina* Benth. & Kunze, Jammu.<sup>49</sup>
78. **Lophodermium Chev., Ascomy., Phacidiales.**  
*L. pinastri* (Schrad.) Chev. Needles of *Pinus excelsa* Wall., Achabal, Kashmir.<sup>165</sup>

79. **Lycoperdon Pers. Basidio., Lycoperdales.**  
*L. pyriforme* Schaeff. Ground, Sonamarg, Kashmir.<sup>41</sup>  
*L. umbrinum* Pers. Ground, Sonamarg, Kashmir.<sup>3</sup>
80. **Marssonina Magn., Deutro., Melanconiales.**  
*M. Juglandis* (Lib.) Magn. Leaves of Walnut trees (perfect stage-*Gnomonia leptostyla* fr. Ces. and de. Not.) Kashmir Valley.<sup>77</sup>
81. **Massaria de Not., Ascomy., Sphaeriales.**  
*M. marginata* Fuckel. Twigs of *Rosa* sps., Harwan, Kashmir.<sup>165</sup>
82. **Melampsora Cast., Basidio., Uredinales**  
*M. ciliata* Barclay. Leaves of *Populus ciliata*, Dubgaon, Kashmir.<sup>166</sup>
83. **Microdiplodia Allesch., Deutro., Sphaeropsidiales.**  
*M. indica* Syd. Living leaves of *Iris* sp., Srinagar, Kashmir.<sup>167</sup>
84. **Monochaetia (Sacc.) Sacc., Deutro., Melanconiales.**  
*M. depazeoides* (Othth.) Sacc. Living leaves of *Rosa moschata*, Achabal, Kashmir.<sup>102</sup>
85. **Morchella Dill. ex Fr., Asco., Pezizales.**  
*M. deliciosa* Fr. Ground, Kashmir.<sup>165</sup>  
*M. esculanta* (L.) Pers. Ground, Kashmir.  
*M. gigaspora* Cooke. Ground, Kashmir.<sup>35</sup>  
*M. rotunda* (Pers.) Boud. ( = *M. esculanta* (L.) Pers.), Ground, Jammu.<sup>194</sup>
86. **Mucor spp. Seed of Atropa belladonna L., Hyocyamus niger L., Chrysanthemum cinerariifolium vis., Anthemum graveolens, Jammu.**
87. **Mycoacia Donk., Basidio., Polyporales.**  
*M. albobiride* (Morg.) Miller & Boyce. On dead wood, Bhadarwah, J & K.<sup>182</sup>

88. **Mycosphaerella Johanson., Ascomy., Sphaeriales.**  
*M. fragariae* (Tul.) Lindnau. Leaves of *Fragaria* sp., Harwan, Kashmir.<sup>197</sup>  
*M. macrospora* (Kleb.) Jorstad. Living leaves of *Iris nepalensis* D. Don., Srinagar.<sup>116</sup>  
*M. numicis* (Desm.) Grove. Leaves of *Rumex nepalensis*, Gulmarg, Kashmir,<sup>117</sup>
89. **Naucoria Fr., Ascomy., Hypocreales.**  
*N. cerodes* Fr. Leh and Indus Valley, Ladakh.<sup>16</sup>
90. **Nectria Fr., Ascomy., Hypocreales.**  
*N. cinnabariana* (tode.) Fr. Branches of *Populus ciliata*, Verinaga, Kashmir, *Prunus armeniaca* Achabal Kashmir<sup>165</sup>
91. **Neocosmospora E.F. Smith, Ascomy., Hypocreales.**  
*N. vasinfecta* Smith. On *Crotalaria mucronata* Desv., Jammu.<sup>174</sup>
92. **Odontia Pers. ex Gray (= Caldesiella) Basidio., Achylophorales.**  
*O. aurigata* (fr.) Quel. *Berberis* sp., Wood and Dung, J.&K.<sup>178</sup>
93. **Omphalia (Fr.) Staude. Basidio., Agaricales.**  
*O. campanella* (Batsch.) Fr. Sonamarg, Kashmir.<sup>113</sup>
94. **Otidea Fuckel, Ascomy., Pezizales.**  
*O. alutacea* (Fr.) Masee var. *typica*, in coniferous forest Udhampur, an Bhadarwah, Jammu.<sup>190</sup>  
*O. kaufmanii* Kanouse. Humicolous Soil in Coniferous forest. Udhampur, and Bhadarwah, Jammu.<sup>190</sup>
95. **Passalora Fr. & Mont., Deutro., Moniliales.**  
*P. kirchneri* (Hegy) Petrak. Leaves of *Anethum graveolens* L., Jammu.
96. **Penicillium Link ex Fr., Deutro., Moniliales.**  
*P. puberulum*. Seeds of *Dacus carota*, Jammu.<sup>143</sup>



- P. spp.* Seeds of *Digitalis purpurea* L., *Hyoscyamus Niger* L., *Chrysanthemum-cinreparifolium* vis., and *Antheum graveolens* L., Jammu.<sup>62</sup>
97. **Periconia Tode ex Schw., Deutro., Moniliales.**  
*P. circinata* (Mangin) Sacc. Dead twigs, Srinagar.<sup>104</sup>  
*P. cookei* Mason & Ellis; On dead twigs, Kashmir.<sup>104</sup>
98. **Peridermium Link., Basidio., Uredinales.**  
*P. piceae* (Barclay) Sacc., Leaves of *Picea morinda* (*Abies smithina*), Kashmir,<sup>163</sup>
99. **Peronospora Corda. Phyco., Peronosporales.**  
*P. aestivialis* Syd. ex Gaum.<sup>52</sup> = R. *P. trifoliorum* de Bary.<sup>22</sup>  
 Leaves of *Glycine hispida*. Larkipur, Kashmir.  
*P. brassicae* Gaum. 52 On *Brassica campestris* and its cultivated varieties.<sup>22</sup> (as *P. parasitica* (Pers.) de Bary.)  
*P. destructor* (Berk.) Casp. Leaves of *Allium cepa* L., Shalimar, Kashmir.<sup>91, 98</sup>  
*P. manshurica* (Naoumoff) Syd. Leaves of *Glycine hispida*, Larkipur, Kashmir.<sup>52, 99</sup>  
*P. variabilis* Gaum. On *chenopodium album*.<sup>52, 22</sup> as *P. effusa*) Various parts of North India.
100. **Peziza Dill. ex Fr., Ascomy. Pezizales.**  
*P. limnaea* Mass, G. Muddy bank of streamlet amid mosses and Liverworts in *Dalix* grove, Phalgam, Kashmir.<sup>190</sup>  
*P. micheli* (Boud.) Dennis. Humicolous Soil in Coniferous forest and wet clayey soil in mixed forest, Udchampur.<sup>190</sup>
101. **Phellinus Quel., Basidio., Agricales.**  
*P. contiguus* (Pers. ex Fr.) Boud. & Gaiz. On stumps of *Quercus incana* Roxb., Bhadarwah, Jammu.<sup>185</sup>
- 101a **Phaeoramularia (Ram & sacc.) Deutro., Moniliales**  
*P. maculicola* (R & S) on leves of *Populus deltoides* Srinagar Kashmir.<sup>140a</sup>

102. **Phialea (Fr.) Gill., Ascomy., Helotiales.**  
*P. cyathoidea* (Bull ex Fr.) Gill. Dead stems of *Salvia glutinosa* L., Basti, Badarwah, Shakhargarh and Batote.<sup>188</sup>
103. **Phleospora Wallr., Deutro., Spheropsidales.**  
*P. cassiae* Thirum. & Naras. Leaves of *Cassia fistula*, Jammu<sup>50</sup>  
*P. mori* (Lev.) Sacc. Leaves of *Morus alba*, Dubgaon, Kashmir.<sup>167</sup>
104. **Phoma Desm., Deutro., Spheropsidales.**  
*P. anaphalidis* Wehmeyer. On *Anaphalis royleana* D.C., Lidder Valley, Kashmir.<sup>200</sup>  
*P. betae* (Oudem) Frank. Leaves of Sugar beet, J & K.<sup>79</sup>  
*P. salicina* Westend. Branches of *Salix* sp., Achabal, Kashmir,<sup>167</sup>
105. **Phragmidium. Link., Basidio., Uredinales.**  
*P. barclayi* Diet. Leaves of *Rubus lasiocarous*, Achabal, Harwan Kashmir,<sup>164</sup>  
*P. egenulum* Syd. & Butler. Leaves of *Rosa webbiana*. Verinag, Kashmir.<sup>167</sup>  
*P. kamtschatka* (Anders.) Arth. & Cummins. On *Rosa webbiana*, Gangabal Lake.<sup>99</sup>  
*P. potentillae* (Pers.) Karst. Leaves of *Potentilla fragarioides*. Achabal, Kashmir; *P. argentea*, N.W. Himalayas.<sup>167</sup>  
*P. rosae-moschatae* Diet. Leaves of *Rosa moschata*, Harwan, Kashmir.<sup>167</sup>  
*P. rubi* (Pers.) Wint. Leaves of *Rubus fruticosus*, Harwan, Kashmir.<sup>37</sup>
106. **Phragmotrichum Kunze apud Kunze Schmid. (TBMS 48 : 357, 1965), Deutro., Melanconiales.**  
*P. chailletii* Kunze. On cone of *Picea smittheana*, Phalgam, Kashmir.<sup>107</sup>

107. **Phyllachora Nits., Asco., Sphaeriales.**

*P. desmodii* P. Henn. Leaves of *Desmodium* sp., Harwan, Kashmir.<sup>165</sup>

*P. erebiae* Syd., Leaves of *Caragana* sp Harwan, Kashmir.<sup>165</sup>

108. **Phyllactinia Lev., Ascomy., Erysiphales.**

*P. corylea* Pers.) Karst. Leaves of *Indigofera geradiana* and *Juglans regia*. Verinag, Kashmir, *Morus alba*, Dubgaon, Kashmir, *Spondias manigifera* Willd., Manthal, Jammu, J&K.<sup>127</sup>

*P. fraxini* (D.C.) Homma. Leaves of *Juglans regia* L., Yarikhah, Kashmir.<sup>122</sup>

*P. guttata* (Wallr. ex Fr.) L., Leaves of *Prunus amygdalus* (L.) Stokes., Mandel, Kashmir.<sup>78</sup>

*P. chenopodii* Sacc. Leaves of *Chenopodium ambrosioides* var. *anhelminticum* Grev., Jammu.<sup>123</sup>

*P. concagineae* Pandotra and Ganguly. Leaves of *Ipomaea coccinea* Linn., Jammu.<sup>122</sup>

*P. cyamopsidis* Rao, V.G. Leaves of *Cyamopsis tetragonoloba* D.C., Jammu.<sup>129</sup>

*P. glycines* Thuem. Leaves of *Glycine hispida*, Verinag, Kashmir.<sup>43</sup>

*P. hortorum* Speg. Leavs of *Solanum melonogena*, Achabal.<sup>43</sup>

*P. humuli* Sacc. & Speg. Leaves of *Humulus lupulus*, Dubgaon, Kashmir.<sup>43</sup>

*P. inermis* Pandotra and Ganguly. Leaves of *Clerodendron inermae* (L.) Gaertn Jammu.<sup>122</sup>

*P. nyctanthesdis* Pandotra and Sastry. Leaves of *Nyctanthes arbortristis* L., Nandani, Jammu.<sup>128</sup>

*P. ocimicola* Pandotra and Ganguly. Leaves of *Ocimum sanctum* L., Jammu.<sup>112</sup>

*P. prunicola* (Opiz) sacc. Leaves of *Prunus armeniaca*, Achabal, Kashmir,

*P. puddum* Verinag, and *P. persica* Achabal, Kashmir.<sup>43</sup>

109. **Phyllostictina Syd., Deutro., Sphaeropsidales.**  
*P. calamagrostidis* Wehmeyer. On *Calamagrostis compacta* Hook ex Paulsen, Rupshu, Kashmir.<sup>200</sup>  
*P. cruenta* (Fr.) Petrak. & Syd. Leaves of *Polypogon* sp., Harwan, Kashmir.<sup>138</sup>
110. **Physarum Pers. em Rostaf., Myxomycetes.**  
*P. globuliferum* (Bull.) Pers. Decaying log of wood under a mixed forest, Patni Top, Jammu.<sup>179</sup>
111. **Piricularia Sacc (=pyricularia Sacc.) Deutro., Moniliales.**  
*P. oryzae* Sacc. On *Oryza sativa* causing blight of rice Srinagar, Kashmir.<sup>71</sup>
112. **Platycarpium Karst., Deutro., Moniliales.**  
*P. cyperacearum* Wehmeyer. On *Kobresia schoenoides* Boeck. and *Carex nubigena* Don., Kashmir.<sup>200</sup>
113. **Pleocheta Sacc and Speg. (=Uncinula Lev.) Ascomy., Pleosporales.**  
*P. shiraiana* (Henn.) KImbr. & Krf. Leaves of *Celtis australis* Linn., Chashmashahi, Kashmir.<sup>127</sup>
114. **Pleospora Rabenh. ex Ces & de Not., Ascomy., Pleosporales.**  
*P. herbarum* (Pers.) Rabenh var. *herbarum* Wehmeyer. On *Veronica lamosa* Royle and *Aphragmus stewaria* Dunn, Kashmir.<sup>199</sup>  
*P. herbarum* var. *occidentalis* Wehmeyer On *Silene tenuis* Willd. and *Onosoma Kashmiricum* I.M. Johnst.<sup>199</sup>  
*P. lactucicola* Eil. & Ev. On *Draba Kashmirica*<sup>199</sup>  
*P. njejusensis* Buback. On *Galium borale* L., and *Linum perenne*.<sup>199</sup>  
*P. richtop7henis* Ell & Ev. On *Chrysanthemum richteria* Benth. ex Hook Kashmir.<sup>199</sup>  
*P. scrophulariae* (Desm.) Hohn. var. *Scrophulariae* Whemeyer. On *Drabalanceolata* Royle, Kashmir.<sup>199</sup>

- P. scrophulariae* (Desm.) Hohn. var. *compositum* Whemeyer  
On *Linum perenne* L., Kashmir.<sup>199</sup>
- P. spinarum* Syd. On spines of *Astragalus* cp., Achabal,  
Kashmir.<sup>165</sup>
115. **Pleurotus (Fr.) Kummer, Basidio., Agaricales.**  
*P. sp.* Dead wood, Jammu.<sup>151</sup>
116. **Podosphaera Kunze. ex. Lev. Ascomy.,  
Erysiphales.**  
*P. leucotricha* (Ell. & Ev.) Salm. Causing mildew of apple  
(*Malus domestica*), Srinagar, Kashmir.<sup>71</sup>
117. **Polyporus (Mich.) Fr. ex Fr., Basidio.,  
Polyporales.**  
*P. adustus* (Willd.) Fr., Nilgris, Sonamarg, Kashmir.<sup>8</sup>  
*P. luscipus* (Bull.) Fr. Living trunks of *Morus*, *Pyrus malus*,  
*Prunus armenica*, and Plum trees, Kashmir.<sup>20, 21, 59, 84</sup>  
*P. picipes* Fr Sonamarg.<sup>12, 42, 85, 113</sup>
118. **Polystictus Fr. (= Coltricia), Basidio.,  
Polyporales.**  
*P. cinnabarinus* (Jacq.) Fr. Old logs, Sonamarg, Kashmir.<sup>16</sup>
119. **Polystigmia Sacc., Ascomy., Sphaeropsidales.**  
*P. rubra* (Desm.) Sacc. Leaves of *Prunus domestica* var.  
*insititia*. Harwan, Kashmir.<sup>167</sup>
120. **Psathyrella (Fr.) Quel., Basidio., Agricales.**  
*P. gracilis* Fr. Ground, Kursar in the Nubra Valley,  
Kashmir.<sup>16</sup>
121. **Pseudohelotium Fuckel, Ascomy., Helotiales.**  
*P. pineti* (Batsch. ex Fr.) Fuck. Dead needles of *Cedrus  
deodra* Laud., Bhadarwah, J & K.<sup>188</sup>
122. **Pseudopeziza Fuck., Ascomy. Helotiales.**  
*P. radians* (Raxb. & Desm.) Sacc. Leaves of *Campanula  
colorata*, near Batotc, Jammu.<sup>29</sup>

*P. skimmiae* Padwick. Living leaves of *Skimmia laureola*, Aru, Kashmir.<sup>29</sup>

*P. trifolii* (Biv.) Fuck. Leaves of *Trifolium pratense*, Verinag Kashmir.<sup>165</sup>

### 123. *Puccinia* Pers., Basidio., Uredinales.

*P. absinthii* D.C. Leaves of *Artemisia* sp., Harwan, 166; of *A. absinthium*, Upper munda, Kashmir.<sup>117</sup>

*P. anthistitiriae* Barcl. Leaves, clums and glumes of *Anthistirriaanathera*, Harwan, Kashmir.<sup>166</sup>

*P. argentata* (Schultz.) Wint. On *Adoxa moscha tellina*, Sonamarg.<sup>9, 10, 16</sup>

*P. artemisiella* Syd. Leaves of *Artemisia vulgaris*, Harwan.<sup>166</sup>

*P. calthae* (Grev.) Link. On *Caltha palustris* var. *alba*, Phalgam.<sup>9, 10</sup>

*P. carduorum* Jacky. Leaves of *Carduus natans* near Aru, Kashmir.<sup>117</sup>

*P. centaureae* Mart. Leaves of *Centurea catatrapa*, Harwan, Kashmir.<sup>166</sup>

*P. chrysopogi* Barclay. Accidia on *Jasminum* sp., Harwan, Telauto stage on leaves of *Chrysopogon gryllus*, Harwan, Kashmir.<sup>13, 164</sup>

*P. chrysopogonis* Barclay. Leaves of *Chrysopogon* sp., Kud.<sup>119</sup>

*P. cichorii* (D.C.) Bellyneck. Leaves of *Cichorium intybus*, Harwan, Kashmir.<sup>166</sup>

*P. coronata* Corda. Uredo and teleuto stages on leaves of *Poa flexuosa* and *Agropyron* sp., Harwan, Kashmir<sup>130, 166</sup>; *Bercheniia lineata*, above Uri Sind Valley, Kashmir<sup>40</sup>. Accidia on leaves of *Rhamnus purpurea*.

*P. crepidis-sibericae* Lindr. On *Crepis siberica*, Sonamarg.<sup>10</sup>

*P. cynodontis* Lacroix. Leaves of *Cynodon dactylon*, Kashmir.<sup>22, 163</sup>

*P. dactylidina* Bubak. Leaves of *Dactylis glomerata*, Harwana, Kashmir.<sup>117, 166</sup>

*P. epilobii-tetragoni* (D.C.) Wint. Leaves of *Epilobium* sp., Harwan, Kashmir.<sup>166</sup>

*P. festucae* Plowr. On *Lonicera pariviflora*, Gulmarg, Kashmir.<sup>9, 10</sup>

*P. geranii-silvatici* arst. Leaves and stems of *Geranium nepalense* Verinag, Kashmir.<sup>13, 14, 46, 166</sup>, *G. pratense*, Nanga Parbat.<sup>195</sup>

*P. glumarum* (Schw.) Erikss. & P. Henn. On wheat and barley, Ladakh, Kashmir.<sup>72</sup>

*P. graminis* Pers. Glumes of *Festuca gigantea* Harwan, *F. Kashmiriana* and *Brachypodium sylvaticum* Harwan Kashmir.<sup>13, 21</sup> On *Iriticum vulgare*, *T. sativum* Lam. and *Lolium perenne*, Jammu.<sup>94</sup>

*P. graminis-tritici* (Pers.) Eriks & P. Henn. On *Triticum sativum* Lam., J & K.<sup>199</sup>.

*P. helianthi* Schw. On leaves of *Helianthus annus*, Pulwama, Kashmir.<sup>53</sup>

*P. heractei*. Grev. On *Heracleum candicans*, Sonamarg, & Srinagar, Kashmir.<sup>10</sup>

*P. heraleicola* Cummins. On *Heracleum thomsonii* var. *glabrior*, Ascent Lohan Gali, Near Telbal, Kashmir.<sup>40</sup>

*P. hieracii* (Roehling.) Mart. Leaves of *Hieracium crocatum*, Harwan, Kashmir.<sup>23</sup> of *H. vulgatum*, Chowderah to Burzila Chowk, Zojila Pass Ladakh Road.<sup>10</sup>

*P. himalensis* (Barclay) Diet. Accidia on leaves of *Hramnus dahurica*, Harwan, Kashmir.<sup>164</sup>

*P. iridis* (D.C.) Wallr. Leaves of *Iris kashmiriana* Harwan, Kashmir, of *Iris* sp., Srinagar,<sup>166</sup> of *I. nepalensis*, Jammu.<sup>50</sup>

*P. libani* Magn. On *Prangos pabularia*, N.W. Himalayas, Jawahar Tunnel, Kashmir.<sup>122</sup>

*P. melasmioides* Tranz. Stems, Leaves and petioles of *Aquilegia vulgari* Aru, Kashmir, of *A. vulgaris* var. *apina*, Kun Pather, Chillan below Zojila Pass.<sup>40</sup>

*P. menthae* Pers. Leaves of *Origanum vulgare* Harwan & Verinag, of *Calamintha clinopodium* Harwan, of *Mentha sylvestris* Shadipur, Kashmir,<sup>160, 164, 166</sup> a variety of *Mentha arvensis* L., Subspecies *haplocalyx* Brig. Var. *piperescens* Holmes, Chakrohi, Kashmir.<sup>47, 49, 50</sup>

*P. Nepalensis* Barclay & Diet. Leaves of *Rumex orientalis*, Harwan Kashmir.<sup>13, 46, 149, 162</sup>

*P. nitida* Barclay. Leaves of *Polygonum* sp., Verinag,<sup>166</sup> of *P. polystachyum* Banihal pass,<sup>40</sup> of *P. affine*, Jammu.<sup>123</sup>

*P. oligocarpa* Syd. & Butler. Leaves of *Stripa* sp. Harwan, Kashmir.<sup>172</sup>

*P. pimpinellae strauss.* Rochling. Leaves of *Pimpinella diversifolia*, Harwan Kashmir.<sup>13, 164</sup>

*P. plicata* Kom. On *Prangos pabularia*, Lohangalli, near Purana Tilel, above Minimarg, Gilgit Road.<sup>40</sup>

*P. polygoni-amphibii* Pres. Leaves of *Polygonum persicaria*, Harwan, of *P. dumclorum* Srinagar.<sup>112</sup>

*P. polygoni* Alb. & Schw. Leaves of *Polygonum orientalis* L., Jammu.<sup>50</sup>

*P. praecox* Bubak. Leaves of *Crepis kashmirica* Sonamarg, Kashmir, of *C. oligocephala*, Banihal pass, Kashmir.<sup>10, 40</sup>

*P. prostii* Mong. Leaves of *Tulipa siellata* Rook, Batoate, Jammu.<sup>119</sup>

*P. prusni-spinosae* Pres. Leaves of *Prunus communis* Verinag Kashmir.<sup>163, 166</sup>

*P. pulsatillae* Kalchbr. On *Aconitum moschatum* and *A. tetrasepala*, Tragbal, Gulmarg, Banihal Pass, Sonamarg.<sup>9, 10</sup>

*P. pulvinata* Rabenh. Leaves of *Echinops cornigerus* Verinag Kashmir.<sup>162</sup>

*P. ribesii-caricis* Kleb. On *Ribes nigrum* Chillara, Gilgit Road.<sup>40</sup>

*P. rubigo-vera* (DC.) Wing. On *Aquilegia* sp., Pahalgam, on *Thalictrum minus* Sonamarg,<sup>9, 10</sup> *Anemone tetrasepala*, Rajdhianganj Pass, Gilgit Road. *Aquilegia vulgaris* subsp. *pubiflora*, Keran, *Clematis orientalis*, Gurikot, Astor Valley,<sup>160</sup> *Thalictrum minus* var. *majus*, Khel-Taubat.<sup>40</sup>

*P. schirajewskii* Tranz. Leaves of *Serratula pallida*, Harwan Kashmir.<sup>166</sup>

*P. scirpi* DC. Accidia on leaves of *Limnanthemum* sp. Wular Lake Kashmir.<sup>157, 166</sup>



- P. silveticella* Arth. & Cummins. On *Taraxicum officinale*, Gulmarg Kashmir.<sup>9</sup>
- P. sonchi* Roberge. Leaves of *Launaea nudicaulis* Srinagar Kashmir.<sup>22, 104</sup>
- P. sorghi* Schw. Leaves of *Zea mays*, Kashmir.<sup>8, 10, 22</sup>
- P. suaveolens* (Link.) Rostrup. Leaves of *Crisium argyracanthus*, Shadipore, Kashmir.<sup>32</sup>
- P. swertiae* Wint. On *Swertia petiolata*, *S. speciosa* Mt. Apharwat & Gulmarg<sup>9, 10</sup> of *S. thomsoni*, Chillum, Gilgit Road and *Swertia* sp. Pir Panchal range.<sup>40</sup>
- P. tanacetii* DC. On *Artemisia vulgaris*, *A. grata* Wall., Kashmir.<sup>50, 119</sup>
- P. taraxaci* Rebert. Plowr. Leaves of *Taraxicum officinale* Harwan.<sup>163, 166</sup>
- P. violae* Schm. DC. Leaves of *Viola* sp., Harwan, of *V. serpens* Harwan.<sup>17, 37, 164</sup>
- P. wattiana* Barclay, Leaves & petioles of *Clematis connata*, Harwan., of *C. grata* Naranag, Wangat Valley, Kashmir.<sup>40</sup>
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- P. butleri* subram. On *Atropa beladonna* L., Drug Farm J & K.<sup>69</sup>
- P. delense* Meura. Causing Stem burn disease and wilt of *Tephrosia vogelii* Hook. f., Jammu.<sup>126</sup>
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- R. armoraciae* Fuckel. On *Allaria petiolata*, Gulmarg.<sup>147</sup>
- R. aromatici* (Sacc.) Hoehn ex. Linduau. Leaves of *Acorus calamus* L., Jammu.<sup>123</sup>
- R. decipiens* Ell. & Ev. Living leaves of *Ranunculus scleratus* Kashmir.<sup>29</sup>
- R. Polygoni* Pandotra and Ganguly. Leave of *Polygonum amplexicaule* D. Don Kukarnag.<sup>122</sup>
- R. Variabilis* Fuck. Leaves of *Digitalis purpurea* linn., Jammu.<sup>121</sup>

- 125(b). **Rhabdospora (Sacc.) Sacc., Deutero., Sphaeropsidales.**  
*R. sisymbri rai*, Saxena & Tewari. Stem of *Sisymbrium loeslii*, Gulmarg ( ).
126. **Rhizoctonia D. ex Fr., Basidio, Tilasnellales..**  
*R. bataticola* (Taub.) Butler. stolen of *Mentha arvensis*, *M. spicata* & *M. cordiaca*, Jammu Tawi.<sup>154</sup> *M. arvensis* sp. *haplocalyx* Briquet. var. *piperascens* Holms, Jammu.  
*Rhizoctonia* spp. On *Digitalis purp.*, Jammu.<sup>62</sup>
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*R. alutacea* Fr. Woods, Gulmarg.<sup>15</sup>
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*S. rolfsii* Sacc. On *Mentha dumatorium* Jammu.<sup>122</sup>; root rot of rye (*Secale cereale* L.) Jammu Tawi.<sup>171</sup>

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*S. hirsutum* (Willd.) Fr. Dead wood, Sonamarg.<sup>16, 59, 85</sup>

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154. **Tilletia Tul., Basidio., Ustilaginales.**

*T. Caries* (DC.) Tul. Ovaries of *Triticum vulgare*, Kashmir.<sup>22,103</sup>

*T. foetidum* (Wallr.) Liro. Ovaries of *Triticum vulgare*, Kashmir<sup>101, 103</sup>, causing bunt of wheat, Srinagar.<sup>71, 75</sup>

155. **Trachyspora Fuckel, Basidio, Uredinales.**

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*T. Subpulverulentum* (Pers.) Fr. Ground Near Sassar, Kashmir.<sup>16</sup>

158. **Trichoscyphella Nannf., Ascomy., Helotiales.**

*T. calycina* (Schum ex Fr.) Nnnf. Dead bark of *Abies pindrow*, Spach, Phalgam, Sanasar, Batote.<sup>188</sup>

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*T. roseum* Link (= *T. roseum* (Pers.) Lin ex Fr.), *Juglans regia*, Kashmir.<sup>119</sup>

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*T. chaetophora* (Hehn.) Donk. Rotting wood of conifer.<sup>184</sup>

*T. Karstenii* (Bres.) Donk. Stumps and fallen leaves of conifers (*Cedrus deodra* Roxb.)

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*U. andropogonis* Tracy. Leaves of *Andropogon* sp. Kund, Jammu.<sup>119</sup>  
*U. behenis* (DC.) Unger. Leaves of *Lychnis indica* Harwan, Kashmir.<sup>166</sup>  
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*G. aconitifolium*, above Chorwan, Gilgit Road, Ladakh.<sup>166</sup>



*U. hedysari-obscuri* (DC.) Lev. Leaves of *Hedysarum cachemirianum* Sonamarg, Ladakh Road.<sup>9,10</sup>

*U. hobsoni* Vize. Leaves of *Jasminium* sp. Kashmir,<sup>24,164</sup>

*U. leptodermus* Syd. Leaves of *Setaria glauca* (L.) Bainer, Kashmir.<sup>119</sup>

*U. lespedzae-procumbentis* (Schw.) Curt. Leaves of *Lespedza picolor*, Harwan.<sup>166</sup>

*U. lycoctoni* (Kalchbir) Trott. On *Aconitum laeve* near Gulmarg, below Kim Patner Kashmir.<sup>9,10</sup>

*U. polygona-acicularis* (Pers.) Karst. Leaves of *Polygonum aviculare*, Harwan.<sup>166</sup>

*P. paronychioides*, Charwan to Burzil Chowki.<sup>40</sup>

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# Host Index

## **Abelmoschus esculentus**

*Clado-sporium sp.*

## **Abies pindrow**

*Astrostrona musicolum*

*Trichosphella colycina*

*Vararia ochroleuca*

## **Acer caesium**

*Septoria gureze*

## **Aconitum leave**

*Uromyces lycoctoni*

## **Aconitum lycoctonum**

*Uromyces acoonite*

## **Acorus calamus**

*Ramularia aromatici*

## **Adoxo moschatellina**

*Puccinia argentata*

## **Agrimonia eupatorium**

*Sphaeratheca macularis*

## **Agropyron sp.**

*Puccinia coronata*

## **Alchemilla vulgaris—Trachyspora intrusa**

## **Allaria officinalis**

*Erysiphe communis*

## **Allaria petiolata**

*Ramularia ammoraciae*

## **Alisma plantago**

*Dassansia alismatis*

**Allium cepa***Hetersporium allii-cepae**Peronospora destructor***Amaranthus blitum***Albugo bliti***Anaphalis royleana***Phoma anaphalidis***Anemone sp.***Synchytrium anemones**Synchytrium sp.***Andropogon sorghum***Glomerella cinquitata**periconia digitata***Anethum graveolens***Alternaria sp.**Cladoosporium sp.**Mucor sp.**Passalora kirchneri**Penicillium sp.***Anthistinia anatheria***Puccinia anthistiriae***Aphragmus stewaria***Pleospora herbarum***Apium qraveolens***Septoria apii-graveolentis***Aquilegia vulgaris***Puccinia melasmioides***Artemisia grata***Puccinia lanaceti*

**Artemisia vulgaris***Puccinia artemisiella**P. tanacetii***Astragalus olipites***Henderosonia astragali***Astragalus sp.***Erysiphe communis**Pleospora spinarum***Athyrium filix-foemina***Hyalospora polypodii***Atropa acuminata***Acochoyta atropae***Atropa belladonna***Alternaria tenuissima**Pythium butleri***Baehmeria nivea***Cercospora krugiana***Berberis sp.***Aecidium montanum**Erysiphe polygoni**Scytinostroma duriunula***Berchenuia lineata***Puccinia coronata***Berleria crustata***Cercospora berlericola***Bidens biternata***Synerotheca fuliginea***Baerhaavia diffusa***Cercospora furfurella**Colletotrichum capsici*

**Brassica campestris***Albugo candida**Peronospora brassicae***Calotropis quigantea***Cercospora calootropidis***Calamagrostis compacta***Phyllostictina calamagrostidis***Calmintha umbrosa***Puccinia minthae***Caltha palustris***Puccinia calthae***Comoanula colorata***Coleosporium campanula**Pseudopeziza radians***Campanula sp.***Diploodia luteo-burnnea***Caragana sp.***Phyllachora erebiae***Cardamine impatiens***Cercospora cardamines***Cardus nutans***Puccinia carduorum***Carex cardiolepis***Cintractia caricis***Carex haematostoma***Cintractia caricis***Carex stenophylla***Cintractia caricis*

**Carissa opaca**

*Colletotrichum inamdarii*

**Carthamus tinctorius**

*Alteraria carthami*

**Cassia jistula**

*Phleospora cassiae*

**Cedrus deodara**

*Amphinema byssoides*

*Helotium lutescens*

*Pseudohelotium pinete* (Dead needles)

*Sarcodon scabrosus*

**Celtis australis**

*Helicoceros celtidis*

*Pleoheta shiraina*

*Thyrostroma mori*

*Uncinulopsis polychaeta*

**Centaurea calcitrapa**

*Puccinia centaureae*

**Cerataegus sp.**

*Cylindrosporium oxycarthiae*

**Chenopodium ambrosioides**

*Erysiphe cichoracearum*

*E. polygoni*

*Phyllosticta chenopodii*

**Chrysanthemum cinerarifolium**

*Cladosporium sp.*

*Fusarium solani*

**Chrysanthemum richteria**

*Pleospora richtophensis*

**Chrysopogon gryllus***Puccinia chrysopogi***Cichorium intybus***Puccinia cichorii***Cimicifuga foetida***Urocystis carcinodes***Cireaea alpina***Puccinia circeae***Clematis connata***Puccinia wattiana***Clematis grata***Puccinia wattiana***Clematis monotana***Coleosporium clematidis***Coicus argyranthus***Septoria diversimaculans***Coceulus pendulus***Colletotrichum destructum**C. truncatum**Curvularia lunata***Colebrokkia oppositifolia***Ascochyta colebrookiae***Conium maculatum***Erysiphe polygoni***Convolvulus arvensis***Erysiohe convolvuli***Cotoneaster aitchinsonii***Venturia inaequalis***Cotoneaster bacillaris***Gymnosporangium distortum***Clematis connata***Puccinia wattiana*



**Clematis grata**

*Puccinia wattiana*

**Clematis monotana**

*Coleosporium clematidis*

**Cretagus oxycantha**

*Gymnosporangium confusum*

**Crepis siberica**

*Puccinia crepidis-sibericae*

**Crisium argyraeanthus**

*Puccinia syaveolens*

**Crotalaria mucronata**

*Neocosmospora vasinfecta*

**Crotalaria verrucosa**

*Fusarium adum*

**Crytolepis buchanani**

*Cercospora crytolepidis*

**Cyamopsis tetragonaloba**

*Phyllostictis cyamopsidis*

**Cydonia vulgaris**

*Entomosporium maculatum*

**Cynodon dactylon**

*Dinemasporium gramineum*

*Puccinia cynodontis*

**Docus carota**

*Alternaria radicina*

*A. tenuis*

*Cercospora apii*

*Penicillium puberulum*

**Dactylis glomerata***Puccinia dactylidina***Datisca cannabina***Coleosporium datiscae***Datura innoxia***Alternaria alternata**Alternaria sp.**Corticium solani***Datura metel***Alternaria crassa***Datura stromonium***Alternaria tenuissima***Dead herbaceous stem***Acrodictya dennisii**Auricularia auricula**Comespora smithii***Dead wood***Cryptocomeum condensatum**Daldinia concentrica**Exosporium extensum**Helicosporium lumbricoides**Hyphoderma pubera**H. setigerum**Lentinus lecomei**Lycoperdon pyriforme**Mycoacia alboviride**Odantia arguta**Periconia circinata**Physarum globuliferum*

*Pleurotus sp.*

*Polyporus picipes*

*P. sulphureus*

*Polystictus cinnabarinus*

*Russula alutcea*

*Scytinostroma duriunula*

*Stereum hirsutum*

*Tetroploa aristata*

*Tubulicimis chaetophora*

*T. karstenii*

*T. subulata*

**Deschampsia koeleroides**

*Hendersonia fucklii*

**Desmodium sp.**

*Phyllachora desmodii*

**Digitalis purpurea**

*Ramularia variabilis*

*Rhizoctonia sp.*

**Delichos lablab**

*Alternaria tenuissima*

*Colletotrichum dematium*

**Dioscorea sp.**

*Cercospora dioscoreae*

**Dioscorea deltoidea**

*Cercospora dioscoreae*

**Draba lanceolata**

*Pleaspora scirphulariae*

**Elsholtzia cristata**

*Septoria elsholtziae*

*Erysiphe polygoni*

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**Epilobium sp.***Puccinia epilobii-tetragoni***Eriobotrya japonica***Alternaria eriobotryae***Eritrichum strictum***Diplodia eitrichii***Eryngium billardieri***Erysiphe polygoni***Eruca sativa***Albugo candida***Erysimum sp.***Pleospora lactucicola***Eucalyptus macarthuri***Cylindroclandium scoparium***Euphorbia dracunculoides***Melamosora helioscopia***Euphorbia emodi***Melampsora helioscopia***Euphorbia helioscopia***Melampsora euphorbiae***Euphorbia pilosa***Sphaerotheca euphorbiae***Fagopyrum esculantum***Cercospora fagopyri***Festuca gigantea***Puccinia graminis***Festuca kashmiriana***Puccinia graminis*

**Foeniculum vulgare**

*Cercospora foeniculi*

**Fragaria sp.**

*Mycosphaerella fragariae*

**Fritillaria roylei**

*Uromyces fritillariae*

**Galium verum**

*Erysiphe cichoracearum*

**Geranium aconitifolium**

*Uromyces geranii*

**Geranium nepalense**

*Aecidium infrequens*

*Puccinia geranii - silyatici*

**Geranium wallivianum**

*Uromyces geranii*

**Geum platum**

*Synchytrium gei*

**Glycine sojae**

*Septoria sojae*

**Glycine max**

*Synchytrium delichii*

**Glycine hispida**

*Peronospora aestivalis*

**Peronospora manshurica**

*Phyllosticta glycines*

**Glycyrrhiza glabra**

*Cercospora cavaruae*

**Gossypium sp.**

*Ascochyta gossypii*

**Gypsophila cerastioides***Septoria gypsophilae***Hamiltonia suaveolens***Cercospora hamiltoniae***Hedysarum cachemirianum***Uromyces hedysariobscuri***Hedera nepalensis***Diplodia heterospora***Helianthus annuus***Puccinia helianthi***Helianthus sp.***Macrophomina phaseoli***Heracleum candicans***Aecidium stewartinum***Heracleum crocatum***Puccinia hieracii***Heracleum sp.***Hendersonia heraclei***Heracleum thomsonii***Puccinia herateicola***Holmskioldia sanguinea***Cercospora holmskioldiae***Hordeum sp.***Puccinia glumarum***Humulus sp.***Septoria lupulina***Humulus lupulus***Phyllosticta humuli**Septoria humuli*

*Septoria lupulina*

**Indigofera gerardiana**

*Phyllactinia corylea*

**Ipomoea sp.**

*Erysiphe polygoni*

**Ipomoea ericarpa**

*Albugo ipomoeae-panduratae*

**Ipomoea coccinea**

*Phyllosticta coccineae*

**Iris sp.**

*Heterosporium gracile*

**Iris kashmiriana**

*Puccinia iridis*

**Iris nepalensis**

*Mycosphaerella macrospora*

*Puccinia iridis*

**Jasmiun auriculatum**

*Alternaria ellissii*

**Jasmiun officianale**

*Cercospora jasminicola*

*Glomerella cingulata*

**Jasmiun sp.**

*Puccinia chrysopogi*

*Uromyces hobsoni*

**Juglans regia**

*Bipolaris spicifera*

*Gnomonia leptostyla*

*Marssonina juglandis*

*Phyllactinia corylea*

*Phyllactinia fraxini*

*Trichotecium roseum*

**Kobresia capillifolia**

*Cinratris elynae*

**Kobresia laxa**

*Cinratia kobresiae*

**Kobresia schoenoides**

*Clathrospora bakeri*

*Platycarpium cyperacearum*

**Kochia trichophila**

*Fusarium solani*

**Lactuca scariola**

*Bremia lactucae*

**Lactuca sp.**

*Scolecotrichum lactucae*

*Septoria lactucae*

**Lagenaria leucantha**

*Sphaerotheca fuliginia*

**Lavatera kashmiriana**

*Endophyllum tuberculatum*

**Lepidium densiflorum**

*Erysiphe cummunis*

**Lespedza bicolor**

*Erysiphe polygoni*

*Uromyces lespedzae-procumbentis*

**Limnanthemum sp.**

*Septoria villarsiae*

**Linum perenne**

*Pleospora niegusensis*

*Pleospora scrophulariae*



**Linum usitatissimum***Melampsora lini***Liquesticum thomsonii***Erysiphe polygoni***Lolium perenne***Puccinia graminis***Lonicera sp.***Lasiobotrys butleri***Lonicera parviflora***Puccinia festucae***Lychnis himalayensis***Sphaeronema himalyens***Lychnis indica***Uromyces behenis***Lycopersicon esculantum***Alternaria tenuis***Melia azadirachta***Cercospora subsessilis***Melilotus albe***Erysiphe polygoni***Mentha arvensis***Curvularia lunata**Erysiphe cichoracaerum**Macrophomina phaseoli**Puccinia menthae**Rhizoctonia bataticola***Mentha dumatorum***Sclerotium rolfsii***Mentha piperata***Erysiphe cichoracaerum*

**Mentha spicata**

*Rhizoctonia bataticola*

**Mentha sylvestris**

*Puccinia menthae*

**Morine longifoliae**

*Ustilago morinae*

**Morus alba**

*Alternaria tenuissima*

*Coniothyrium albae*

*Cytospora atra*

*Diplodia butleri*

*Phleospora mori*

*Thyrostroma mori*

**Morus sp.**

*Phyllactinia corylea*

*Polyponus hispidis*

**Moss**

*Bovita lycoperdioides*

**Myriectis nepalensis**

*Aecidium myriactidis*

*Septoria myriactidis*

**Mycanthus arbortristis**

*Phyllosticta nyctanthedis*

**Ocimum basilicum**

*Cercospora canescens*

*Glomerella cingulata*

**Ocimum sanctum**

*Phyllosticta ocimicola*

**Onosoma kashmiricum**

*Pleospora herbarum*

**Organum vulgare***Piccinia menthae***Oryza sativa***Pyricularia oryzae***Oryzopsis munroi***Urocystis oryzopsidis***Panicum maliacum***Sphaerolotheca destruens***Papaver somniferum***Erysiphe cichoracearum***Paspalum commersonii***Uredo paspali***Pennisetum flaccidum***Sphaerolotheca stewartii***Petroselinum crispum***Septoria petroselini***Perigularia daemia***Alternaria tenuissima***Pergularia pallida***Ascochyta perigularia***Phagnalon nivenum***Diplodia atrobrunnea***Phaseolus vulgaris***Ascochyta phaseolorum**Cercospora cruenta***Phoenix dactylifera***Graphiola phoenicis**Rhynchospora peruvianum**Erysiphe cichoraclaerum*

**Picea smithiana***Phragmotrichum ehaidletii***Pimpinella diversifolia***Puccinia pimpinella***Pinus excelsa***Capnodium pini**Coleosporium barclayense**Lophodermium pinastri***Pinus longifolia***Coleosporium campanulae***Pinus wallichiana***Auris calpium-vulgare***Pisum sativum***Erysiphe polygoni***Plantago sp.***Septoria plantaginea***Plantago brachyphylla***Erysiphe cichoracearum***Platinus orientalis***Sphaeropsis loranthi***Plectranthus rugosus***Erysiphe polygoni***Poa sp.***Erysiphe graminis**Urocystis agropogi***Poa flexuosa***Puccinia coronata***Podophyllum emodi***Cercospora emodi**Cercospora podophylli*

**Polygonum affine***Puccinia nitida***Polygonum aviculare***Erysiphe polygoni**Uromyces polygonia - avicularis***Polygonum polystachyum***Puccinia nitida***Polygonum serrulatum***Sphacelotheca hydropiperis***Polygonum sp.***Puccinia nitida**Septoria polygonicola**Ustilago anomala**Ustilago raticulata***Populus alba***Cladosporium martianoffinum***Populus balsamifera***Uncinula adunca***Populus deltoides***Phaeoramularia maculicola***Populus ciliata***Cytospora chrysosperma**Malampsora ciliata**Nectria cinnabarina***Populus niger***Cercospora jamuensis***Portulaca oleracea***Albugo portulacae*

**Potamogeton sp.***Doassansiopsis martianofiana***Potentilla fragarioides***Phragmidium potentillae***Potentilla eriocarpa***Sphaerotheca fuliginea***Prangos pabularia***Puccinia libani***Prunus armeniaca***Colletotrichum gloeosporoides**Nectria cinnabarina**Phyllosticta prunicola**Polyporum hispidus**Stigmina carpophylla***Prunus amygdalus***Cercospora rubrotincta**Phyllactinia guttata**Sphaerotheca pannosa**Stigmina carpophylla**Tephрина deformans***Prunus avium***Cercospora rubrotincta**Stigmina carpophylla***Prunus domestica***Polystionina rubra**Uncinula prunastri***Prunus sp.***Sordaria humana***Prunus persica***Sclerotinia cinerea**Sphaerotheca pannosa*

*Stigmina carpophylla*

*Tephрина deformans*

**Pucciniella distans**

*Septoria sigmoidea*

**Pyrus communis**

*Alternaria tenuis*

*Discosia artocreas*

*Entomosporium maculatum*

**Pyrus malus syn (Malus domestica)**

*Circinotrichum maculiformae*

*C. obscurus*

*Coniothecium chomatosporium*

*C. olivaceum*

*C. pyrinum*

*Erysiphe heraclei*

*Helicotrichum obscurum*

*Leptothyrium pomi*

*Oothecium indicum*

*Podosphaera leucotricha*

*Polyporus hispidus*

*Spilocaea pomi*

*Venturia inaequalis*

**Pyrus pashia**

*Entomosporium maculatum*

*Taphrina bullata*

**Quercus sp.**

*Scytinostroma duriunila*

**Quercus sp.**

*Scytinostroma duriunila*

**Quercus dilatata***Sphaerotheca lanestris***Quercus incana***Phallinus contiguus***Ranunculus diffusa***Erysiphe polygoni***Ranunculus hirtellus***Aecidium ranunculacearum***Ranunculus lactus***Erysiphe polygoni***Ranunculus muricatus***Erysiphe ranunculi***Ranunculus scloeratus***Septocylindrium ranunculi**Ramularia decipiens***Ranunculus sp.***Erysiphe polygoni**Urocystis anemones***Rhamnus dahurica***Puccinia himalyensis***Rheum webbiana***Ustilago stewartii***Robinia pseudoacacia***Erysiphe trifolii***Rosa moschata***Monochaetia depazeoides**Phragmidium rosae-moschatae***Rosa webbiana***Phragmidium egenulum**P. kamts-chatke*



*P. rosae-mosclatae*

*Teleconia rosae*

**Rosa sp.**

*Cercospora rosicola*

*Diplocarpon rosae*

*Massaria marginata*

*Septoria rosarum*

*Sphaerotheca pannosa*

**Rottboellia speciosa**

*Uromyces rottboelliae*

**Rouwolfia serpentina**

*Alternaria tenuis*

*Cercospora serpentina*

*Corynespora cassiicola*

*Fusarium oxysporum*

*Leveillula taurica*

**Rubus sp.**

*Cercospora rubi*

**Rubus fruticosus**

*Phragmidium rubi*

**Rubus lasiocarpus**

*Phragmidium barclayi*

*Septoria rubi*

**Rumex xp.**

*Erysiphe communis*

**Rumex maritimus**

*Cercospora rumicis*

**Rumex nepalensis**

*Erysiphe polygoni*

*Mycosphaerella rumicis*

**Rumex orientalis***Erysiphe polygoni**Puccinia nepalensis***Rye***Sclerotium rolfsii***Saccharum***Phoma betae***Salix sp.***Melampsora terci-capreaium**Phoma salicina***Salix alba***Cytospora salicis***Salix babylonica***Uncinula adunca***Salix caprea***Uncinula adunca***Salix hastata***Melampsora larici-epitea***Salvia glutinosa***Phialea cythoides***Sambucus ebulus***Ascocyta sambuci**Erysiphe sambuci***Saussurea sp.***Erysiphe cichoracearum***Scrophularia sp.***Septoria scrophulariae***Seigesbekia orientalis***Sphaerotheca macularis*

**Serratula phallida**

*Albugo tragopogonis*

**Setaria glauca**

*Uromyces leptodermus*

**Shorea robusta**

*Lentinus strigosus*

**Sisymbrii loeslii**

*Rhabdospora sisymbrii*

**Skin of man**

*Achorian actoni*

*A. scheonleini*

**Smilax macrophylla**

*Cercospora smilacis*

**Soil**

*Agricus campestris*

*Caloscypha fulgens*

*Calyatia gigantea*

*C. saccale*

*Chyrosporium sp.*

*C. tropicum*

*Clavaria jacouemontii*

*C. muscoides*

*Clavulinopsis comiculata*

*Ctenomyces serratus*

*Discina perlata*

*Elvela crispa*

*Fomes ungulatus*

*Gyropharagium delilei*

*Helvella crispa*

*Hydnellum auratile*

*Hydnum aitchisoni*

*Lamprospora creehqueranthi*

*Lycoperdon umbrinum*

*Morchella deliciosa*

*M. gigaspora*

*M. rotunda*

*Omphalia campanella*

*Otidea alutacea*

*O. kaufmanii*

*Peziza limnaea*

*P. micheli*

*Polyporus adustus*

*P. umbellatus (Edible)*

*Psathrella gracilis*

*Sarcocypha coccinea*

*Strobilomyces strobilaceus*

*Thelephora palmata*

*Tricholoma melaleucum*

*T. subpulverulentum*

*Verpa bohemica*

### **Solanum melenogena**

*Phyllosticta hortorum*

### **Solanum tuberosum**

*Alternaria tenuis*

### **Sonchus oleraceus**

*Bremia lactucae*

### **Spinacea oleracea**

*Heterosporium variable*

**Spondias mangifera***Phyllosticta corylea***Stachytarpheta indica***Cercospora stachytarphetae***Stachys sylvatica***Erysiphe galeopsidis***Stipa siberica***Erysiphe graminis**Urocystis stripae***Stipa sp.***Diplodina butleri**Epichloe typhina**Puccinia oligocarpa**Septoria stripina***Tectona grandis***Auricularia mescutrica***Tephrosia vagelii***Pythium delense***Teraxacum officinale***Cicinnobolus cesatis**Puccinea taraxaci**Sphaerotheca macularis***Tetragium sulcatum***Cercospora tetragioides***Thesum himalayense***Diplodis thesii***Trifolium pratense***Pseudopeziza trifolii**Uromyces trifolii*

**Trifolium repens***Uromyces trifolii***Tinospora cordifolia***Cercospora tinosporae***Tinospora malabarica***Cercospora tinosporae***Triticum sp.***Dilophospora superba**Puccinia glumerum**Tilletia caries**I. foetidum***Triticum sativum***Puccinii graminis**P. graminis-tritici**Ustilago nuda***Triticum vulgare***Puccinia graminis**Tilletia caries**T. foetidum***Vallara heynei***Cercospora pungabensis***Verbena officinalis***Septoria verbenae***Veronica verna***Schroeteria delastrina***Viburnum sp.***Septoria butleri***Viola sp.***Puccinia violae*

**Viola partrinii**

*Cercospora violae*

**Viola serpens**

*Puccinia violae*

**Vitis vinefera**

*Cercospora viticola*

*Uncinula necator*

**Wattakaka volubilis**

*Septoria wattakakae*

**Wikstroemia canescens**

*Melampsora yoshinagai*

**Withania somnifera**

*Cercospora withaniae*

**Zea mays**

*Helminthosporium turcicum*

*Ustilago maydis*

*Ustilago zeae*

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# Glossary\*

- A (Angstrom)*-A unit of length equal to 1/10 millimicron ( $\mu$ ) or 1/10,000 micron ( $\mu$ ).
- Abscission layer*-A zone of delicate, thin-walled cells surrounding a lesion of a leaf, the breakdown of which disjoins the affected area from the rest of the leaf.
- Acervulus*-A subepidermal, saucer-shaped, asexual fruiting body producing short conidiophores and conidia.
- Actinomycetes*-A group of microorganisms apparently intermediate between bacteria and fungi, and classified as either.
- ADP (Adenosine diphosphate)*-A compound which upon phosphorylation (addition of phosphate and energy) forms high energy bonds as ATP.
- Etiolation*— Yellowing of tissue and elongating of stems caused by reduced light or darkness.
- Exclusion*— Control of plant disease by excluding the pathogen or infected plant material from disease-free areas.
- Exudate*— Liquid discharge from diseased or healthy plant tissue.
- Facultative parasite*— An organism that is usually saprophytic but which under certain conditions may become parasitic.
- Facultative saprophyte*— An organism that is usually parasitic but which may also live as a saprophyte.
- Fermentation*— Oxidation of certain organic substances in the absence of molecular oxygen.
- Fertilization*— The sexual union of two protoplasts resulting in doubling of chromosome numbers.
- Filamentous*— Threadlike; filiform.
- Filiform*— Threadlike; filamentous.
- Flagellum*— A whiplike structure projecting from a bacterium or zoo-spore and functioning as an organ of locomotion. Also called a cilium.

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\* Agrios, G.N. (1988) plant Pathology, Academic Press

**Flagging**— The loss of rigidity and drooping of leaves and tender shoots preceding the wilting of a plant.

**Fleck**— A minute spot.

**Fluorescein**— A fluorescent substance adsorbed to antibodies in order to facilitate their detection and location on a tissue.

**Free-living**— Of a microorganism that lives freely, unattached; or a pathogen living in the soil, outside its host.

**Fructification**— Production of spores by fungi. Also, a fruiting body.

**Fruiting body**— A complex fungal structure containing spores.

**Fruiting body**— A complex fungal structure containing spores.

**Fumigant**— A toxic gas or volatile substance that is used to disinfect certain areas from various pests.

**Fumigation**— The application of a fumigant for disinfestation of an area.

**Fungicide**— A compound toxic to fungi.

**Fungistatic**— A compound that prevents fungus growth without killing the fungus.

**Fungus**— An undifferentiated plant lacking chlorophyll and conductive tissues.

**Gall**— A swelling or overgrowth produced on a plant as a result of infection by certain pathogens.

**Gametangium**— A male or female reproductive cell or the nuclei within a gametangium.

**Gel**— A jellylike colloidal mass.

**Gene**— A material substance in the chromosome which determines or conditions one or more hereditary characters. The smallest functioning unit of the genetic material.

**Genotype**— The aggregate of genes in an organism.

**Germ tube**— The early growth of mycelium produced by a germinated fungus spore.

**Germination**— The beginning of growth of a spore or seed.

**Giant cell**— A multinucleate mass of protoplasm formed by coalescence of several adjacent plant cells. Also called a syncytium. Found in plants infected by certain nematodes.



- Gibberellins*— A group of plant growth-regulating substances with a variety of functions.
- Glycolysis*— The breakdown of glucose to pyruvic acid.
- Grafting*— A method of plant propagation by transplantation of a bud or a scion of a plant on another plant. Also, the joining of cut surfaces of two plants so as to form a living union.
- Growth inhibitor*— A natural substance that inhibits the growth of a plant.
- Growth regulator*— A natural substance that regulates the enlargement, division or activation of plant cells.
- Gum*— Complex polysaccharidal substances formed by cells in reaction to wounding or infection.
- Gummosis*— Production of gum by or in a plant tissue.
- Guttation*— Exudation of water from plants, particularly along the leaf margin.
- Habitat*— The natural place of occurrence of an organism.
- Haploid*— A cell or an organism whose nuclei have a single complete set of chromosomes.
- Hatching factor*— A material produced by the roots of certain plants that is believed to increase the hatching of eggs of certain nematodes.
- Hasutorium*— A projection of hyphae into host cells which acts as a penetration and absorbing organ.
- Hemicellulose*— A group of polysaccharides resembling cellulose and occurring in the cell wall.
- Herbaceous plant*— A higher plant that does not develop woody tissues.
- Hermaphrodite*— An individual bearing both functional male and female reproductive organs.
- Heteroecious*— Requiring two different kinds of hosts to complete its life cycle. Pertaining particularly to rust fungi.
- Heterokaryosis*— The condition in which a mycelium contains two genetically different nuclei per cell.
- Heterothallic fungi*— Fungi producing compatible male and female gametes on physiologically distinct mycelia.

- Heterotrophic*— Depending on an outside source for organic nutrients.
- Heterozygous*— Having a dominant and a recessive gene of a pair in the same cell or organism.
- Homothallic fungus*— A fungus producing compatible male and female gametes on the same mycelium.
- Homozygous*— Of a cell or organism having both genes of a pair dominant or recessive.
- Hormone*— A growth regulator. Frequently referring particularly to auxins.
- Host*— A plant that is invaded by a parasite and from which the parasite obtains its nutrients.
- Host range*— The various kinds of host plants that may be attacked by a parasite.
- Hyaline*— Colorless, transparent.
- Hybrid*— The offspring of two individuals differing in one or more heritable characteristics.
- Hybridization*— The crossing of two individuals differing in one or more heritable characteristics.
- Hydathodes*— Structures with one or more openings that discharge water from the interior of the leaf to its surface.
- Hydrolysis*— The enzymatic breakdown of a compound through the addition of water.
- Hyperplasia*— A plant overgrowth due to increased cell division.
- Hypersensitivity*— Excessive sensitivity of plant tissues to certain pathogens. Affected cells are killed quickly, blocking the advance of obligate parasites.
- Hypertrophy*— A plant overgrowth due to abnormal cell enlargement.
- Hypha*— A single branch of a mycelium.
- Hypodermis*— The cellular layer beneath the cuticle of a nematode.
- Hypoplasia*— Underdevelopment of a tissue or plant due to decreased cell division.
- Hypostatic gene*— A gene whose properties are suppressed in the presence of another (epistatic) gene.
- Hypotrophy*— Underdevelopment of a tissue or plant due to abnormally reduced cell enlargement.

- Immune*— Exempt from infection by a given pathogen.
- Immunity*— The state of being immune.
- Imperfect fungus*— A fungus that is not known to produce sexual spores.
- Imperfect stage*— The part of the life cycle of a fungus in which no sexual spores are produced.
- Incubation period*— The period of time between penetration of a host by a pathogen and the first appearance of symptoms on the host.
- Indexing*— A procedure to determine whether a given plant is infected by a virus. It involves the transfer of a bud, scion, sap, etc., from one plant top one or more kinds of (indicator) plants that are sensitive to the virus.
- Indicator*— A plant that reacts to certain viruses or environmental factors with production of specific symptoms and is used for detection and identification of these factors.
- Infection*— The establishment of a parasite within a host plant.
- Infectious disease*— A disease that is caused by a pathogen which can spread from a diseased to a healthy plant.
- Infested*— Containing great numbers of insects, mites, nematodes, etc., as applied to an area or field. Also applied to a plant surface or soil contaminated with bacteria, fungi, etc.
- Injury*— Damage of a plant by an animal, physical, or chemical agent.
- Inoculate*— To bring a pathogen into contact with a host plant or plant organ.
- Inoculation*— The arrival or transfer of a pathogen onto a host.
- Inoculum*— The pathogen or its parts that can cause disease. That portion of individual pathogens that are brought into contact with the host.
- Intercalary*— Formed along and within the mycelium-not at the hyphal tips.
- Intercellular*— Between cells.
- Interference*— The interference of one virus with the multiplication or the disease-producing capabilities of a second, unrelated virus.

- Intracellular*— Within or through the cells.
- Invasion*— The spread of a pathogen into the host.
- In vitro*— In culture. Outside the host.
- In vivo*— In the host.
- Isolate*— A single spore or culture and the subcultures derived from it. Also used to indicate collections of a pathogen made at different times.
- Isolation*— The separation of a pathogen from its host and its culture on a nutrient medium.
- Isoelectric precipitation*— The precipitation from suspension of a virus or a protein when the  $p^H$  is at the isoelectric point, i.e., when there is no positive or negative surface charge on the virus or protein.
- Krebs cycle*— A cyclical series of steps in which pyruvate is oxidized through the mediation of several organic acids.
- Larva*— A nematode between the embryo and the adult; an immature nematode.
- Virus that does not induce symptom development in its host.
- Leaf spot*— A self-limiting lesion on a leaf.
- Lenticel*— A structure of the bark, some fruits, etc., which permits the inward and outward passage of gasses.
- Lesion*— A localized area of discolored, diseased tissue.
- Life cycle*— The stage or successive stages in the growth and development of an organism that occur between the appearance and reappearance of the same stage (e.g., spore) of the organism.
- Lignification*— Impregnation of cell walls with lignin.
- Lignin*— A complex organic substance or group of substances that impregnates the cell walls of xylem vessels and certain other plants cells.
- Ligninase*— An enzyme that breaks down lignin.
- Lipase*— An enzyme that breaks fats into glycerin and fatty acids.
- Lipids*— Substances whose molecules consist of glycerin and fatty acids and sometimes certain additional types of compounds.
- Local lesion*— A localized spot produced on a leaf upon mechanical inoculation with a virus.

- Lumen*— The cavity of the cell within the cell walls.
- Lyophilization*— Long-term preservation of microorganisms or tissues by quick freezing at low temperatures and desiccation under high vacuum.
- Lysis*— A breakdown or dissolution of cells by enzymes or viruses.
- u (micron)*— A unit of length equal to 1/1000 of a millimeter.
- mu (millimicron)*— A unit of length equal to 1/1000 of a micron.
- mm (millimeter)*— A unit of length equal to 1/10 of a centimeter (cm) or 0.03937 of an inch.
- Macroscopic*— Visible without the aid of a magnifying lense or a microscope.
- Malignant* — Used of a cell or tissue that divides and enlarges autonomously, i.e., its growth can no longer be controlled by the organism on which it is growing.
- Masked symptoms*— Virus-induced plant symptoms that are absent under certain environmental conditions but appear when the host is exposed to certain conditions of light and temperature.
- Mechanical inoculation*— Inoculation of a plant with a virus through transfer of sap from a virus-infected plant to a healthy plant.
- Meiosis*— The first two divisions of a zygote that produce the gametes or haploid individuals. In meiosis the chromosome number is halved and genetic recombinations occur.
- Meristem*— The undifferentiated tissue the cells of which can divide continually and differentiate into specialized tissues.
- Mesophyll*— The leaf parenchyma cells between epidermal layer.
- Messenger RNA*— A chain of ribonucleotides that codes for a specific protein.
- Metabolism*— The process by which cells or organisms utilize nutritive material to build living matter and structural components, or break down cellular material into simple substances to perform special functions.
- Microfibril*— A bundle of cellulose molecule chains arranged in crystalline and in amorphous regions.
- Microscopic*— Very small; can be seen only with the aid of a microscope.

**Middle lamella**— The cementing layer between adjacent cell walls; it generally consists of pectinaceous materials, except in woody tissues, where pectin is replaced lignin.

**Migratory**— Migrating from plant to plant.

**Mildew**— A fungal disease of plants in which the mycelium and spores of the fungus are seen as a whitish growth on the host surface.

**Mitochondrion**— A small cytoplasmic particle associated with intracellular respiration.

**Mitosis**— Nuclear division in which the chromosomes duplicate longitudinally and are equally divided and distributed to the daughter nuclei.

**Mold**— Any profuse or woolly fungus growth on damp or decaying matter or on surface of plant tissue.

**Molt**— The shedding or casting off of the cuticle.

**Monokaryotic**— Containing one nucleus.

**Mosaic**— Symptom of certain viral diseases of plants characterized by intermingled patches of normal and light green or yellowish colour.

**Mottle**— An irregular pattern of indistinct light and dark areas.

**Mummy**— A dried, shriveled fruit.

**Mutant**— An individual possessing a new, heritable characteristic as a result of a mutation.

**Mutation**— An abrupt appearance of a new characteristic in an individual as the result of an accidental change in genes or chromosomes.

**Mycelium**— The hypha or mass of hyphae that make up the body of a fungus.

very small, bacteria-like microorganisms, intermediate between viruses and bacteria.

**Mycorrhiza**— A symbiotic association of a fungus with the roots of a plant.

**NAD (Nicotinamide adenine dinucleotide)**— The oxidized form of the coenzyme of an enzyme involved in respiration.  $\text{NADH}_2$  is the reduced form of the coenzyme. NAD was formerly called DPN (diphosphopyridine nucleotide).

*NADP* (*Nicotinamide adenine dinucleotide phosphate*)— A coenzyme involved in respiration.  $\text{NADPH}_2$  is its reduced form. *NADP* was previously known as  $\text{TPN}^2$  (triphosphopyridine nucleotide).

*Natural openings*— Stomata, lenticels, and hydathodes.

*Necrotic*— Dead and discolored.

*Nectarthode*— An opening at the base of a flower from which nectar exudes.

compound or physical agent that kills or inhibits nematodes.

Microscopic, wormlike animals that live saprophytically in water or soil, or as parasites of plants and animals.

*Neutralization*— A serological test in which a virus in suspension is neutralized by specific antibodies added to the suspension and loses its infectivity.

*Noninfectious disease*— A disease that is caused by an environmental factor, not by a pathogen.

*Nonseptate*— Without cross walls.

*Nucleic acid*— An acidic substance containing pentose, phosphorus, and pyrimidine and purine bases, Nucleic acids determine the genetic properties of organisms.

*Nucleolus*— A dense protoplasmic body within the nucleus.

*Nucleoprotein*— Referring to viruses: consisting of nucleic acid and protein.

*Nucleoside*— The combination of a sugar and a base molecule in a nucleic acid.

*Nucleotide*— The phosphoric ester of a nucleoside. Nucleotides are the building blocks of DNA and RNA.

*Nucleus*— The dense protoplasmic body found in all cellular organisms and being essential in all synthetic and developmental activities of a cell.

*Obligate parasite*— A parasite that in nature can grow and multiply only on living organisms.

*Oogonium*— The female gametangium of some phycomycetes (Oomycetes) containing one or more gametes.

- Oomycete*— A fungus that produces oospores. An order of the phycomycetes.
- Oospore*— A sexual spore produced by the union of two morphologically different gametangia (oogonium and antheridium).
- Osmosis*— The diffusion of a solvent through a differentially permeable membrane.
- Ostiole*— A porelike opening in perithecia and phenidia through which the spores escape from the fruiting body.
- Ovary*— The female reproductive structure that produces or contains the egg.
- Oviduct*— The portion of the female reproductive system between the ovary and the uterus.
- Ovoviparous*— Producing eggs that hatch within the uterus.
- Oxidation*— A chemical reaction in which oxygen combines with another substance or in which hydrogen atoms or electrons are removed from a substance.
- Oxidative phosphorylation*— The utilization of energy released by the oxidative reactions of respiration to form high energy ATP bonds.
- Ozone (O<sub>3</sub>)*— A highly reactive form of oxygen that in relatively high concentrations may injure plants.
- Palisade parenchyma*— Elongated cells found just beneath the upper epidermis of leaves and containing chloroplasts.
- PAN (Peroxyacyl nitrates)*— Air pollutants produced as by-products in the exhausts of internal combustion engines and injurious to plants.
- Papillate*— Bearing a papilla, i.e., a hump or swelling.
- Paraphysis*— A sterile hypha present in some fruiting bodies of fungi.
- Parasexualism*— A mechanism whereby recombination of hereditary properties is based on mitosis.
- Parasite*— An organism living on or in another living organism (host) and obtaining its food from the latter.
- Parenchyma*— A tissue composed of thin-walled cells which usually leave intercellular spaces between them.



- Parthenogenesis*— Reproduction from eggs without fertilization by sperm cells.
- Pasteur effect*— The phenomenon in respiration in which, in the presence of oxygen, fermentation is suppressed.
- Pathogen*— An entity that can incite disease.
- Pathogenicity*— The relative capability of a pathogen to cause disease.
- Pectin*— A methylated polymer of galacturonic and found in the middle lamella and the primary cell wall.
- Pectinase*— An enzyme that breaks down pectin.
- Penetration*— The initial invasion of a host by a pathogen.
- Pentose pathway*— Oxidation of glucose by elimination of one carbon atom as  $\text{CO}_2$  and formation of five-carbon sugars.
- Perennial mycelium*— Mycelium overwintering, such on or in a host plant.
- Perfect stage*— The sexual stage (e.g., fruiting bodies) in the life cycle of a fungus.
- Pericycle*— Tissue generally found in the root and bound externally by the endodermis and internally by the phloem.
- Peridium*— The external covering of certain fruiting bodies of some fungi.
- Perithecium*— The globular or flask-shaped ascocarp of the Pyrenomycetes, having an opening or pore (ostiole).
- Phage*— A virus that attacks bacteria; also called bacteriophage.
- Phasmid*— One of a pair of lateral caudal swellings of a nematode believed to be chemoreceptive.
- Phellogen*— Also called cork cambium; it is cambium giving rise externally to cork and in some plants internally to phellogen.
- Phenolic*— Applied to a compound that contains one or more phenolic rings.
- Phenotype*— The external visible appearance of an organism.
- Phloem*— Food-conducting tissue, consisting of sieve tubes, companion cells, phloem parenchyma, and fibers.
- Phosphorylation*— The addition of phosphate to a compound.
- Photoperiod*— The optimum duration of light and darkness for the

normal growth and maturity of a plant in nature.

*Photosynthesis*— The process by which carbon dioxide and water are combined in the presence of light and chlorophyll to form carbohydrate.

*Phycomycetes*— A group of fungi whose mycelium has no cross walls.

*Physiologic race*— One of a group of microorganisms like in morphology but unlike in certain cultural, physiological, pathological, or other characters.

*Phytoalexin*— A substance which inhibits the development of a fungus on hypersensitive tissue, formed only when host plant cells come in contact with the parasite.

*Phytopathogenic*— Term applicable to a microorganism that can incite disease in plants.

*Phytotoxic*— Toxic to plants.

*Pistil*— The central organ of flowers, typically consisting of ovary, style, and stigma.

*Pit*— A small membranous area of membranous area of a generally thick cell wall.

*Pith*— The parenchymatous tissue in the central area of a stem.

*Plasmalemma*— The cytoplasmic membrane found on the outside of the protoplast adjacent to the cell wall.

*Plasmodesma* (*Plural = plasmodesmata*)— A fine protoplasmic thread connecting two protoplasts and passing through the wall which separates the two protoplasts.

*Plasmodium*— A naked, slimy mass of protoplasm containing numerous nuclei.

*Plasmolysis*— The shrinking and separation of the cytoplasm from the cell wall, due to removal of water from the protoplast.

*Plastid*— A specialized cytoplasmic structure.

*Plerome*— The plant tissues inside the cortex.

or crystal with many plane faces.

*Polysaccharide*— A large organic molecule consisting of many units of a simple sugar.

*Polysome* (*or polyribosome*)— A cluster of ribosomes associated with a messenger RNA.

*Precipitin*— An antibody that causes precipitation of soluble antigens.

*Predator*— An organism which lives by preying upon animals.

*Primary infection*— The first infection of a plant in the spring by the overwintering pathogen.

*Primary inoculum*— The overwintering pathogen or its spores that cause primary infections.

*Proliferation*— A rapid and repeated production of new cells, tissues, or organs.

*Promycelium*— The short hypha produced by the teliospore; the basidium.

that multiplies in its insect vector.

*Protectant*— A substance that protects an organism against infection by a pathogen.

*Protein*— A high molecular weight compound consisting of amino acids. It may be a structural protein or an enzyme.

*Protein subunit*— A small protein molecule that is the structural and chemical unit of the protein coat of a virus; a capsomere.

*Protophloem*— The conductive tissue of actively growing parts of the plant. Its sieve tubes function for a brief period, and are replaced by metaphloem elements.

*Protoplast*— The organized living unit of a single cell; everything inside the cytoplasmic membrane.

*protoxylem*— The conductive tissue that appears at the beginning of vascular differentiation and usually matures before the organ completes its elongation; it is followed by formation of metaxylem which matures after tissue elongation is finished.

in the life cycle of insects between the larva and the adult and during which the insect is usually enclosed in a case or cocoon.

*Purification*— The separation of virus particles in a pure form free from cell components.

*Pustule*— Small blisterlike elevation of epidermis as spores emerge.

*Pycnidium*— An asexual, spherical or flask-shaped fruiting body lined inside with conidiophores and producing conidia.

*Pycniospore*— Also called a spermatium. A spore produced in a pycnium.

**Pycnium**— Also called a spermatogonium. A fruiting body of the rust fungi that produces small spores called pycniospores or spermatia which cannot infect plants but function as gametes or gametangia.

**Quarantine**— Control of import and export of plants to prevent spread of diseases and pests.

**Race**— A genetically and often geographically distinct mating group within a species; also a group of pathogens with distinct pathological or physiological properties.

**Receptive hypha**— A specialized hypha protruding out of a pycnium and functioning as a female gamete or gametangium.

**Recessive**— A heritable character or gene which is expressed only when present in an organism in the homozygous condition and which in a heterozygous condition is suppressed by the dominant allele of the pair.

**Reduction**— Any chemical reaction involving the removal of oxygen from or the addition of hydrogen to a substance; it occurs with concomitant expenditure of energy.

**Resistance**— The ability of an organism to overcome, completely or in some degree, the effect of a pathogen or other damaging factor.

**Resistant**— Possessing qualities that hinder the development of a given pathogen.

**Respiration**— A series of chemical oxidations within the cell controlled and catalyzed by enzymes in which carbohydrate and fats are broken down, releasing energy to be used by the cell or organism in its various functions.

**Resting stage**— An inactive stage of a fungus, usually a thick-walled spore.

**Resting spore**— A sexual or other thick-walled spore of a fungus that is resistant to extremes in temperature and moisture and which often germinates only after a period of time from its formation.

**Reticulate**— Covered with netlike ridges.

**Rhizoid**— A short, thin hypha growing in a rootlike fashion toward the substrate.

**Rhizosphere**— The soil near a living root.

- Ribosome*— A subcellular particle involved in protein synthesis.
- Ringspot*— A circular area of chlorosis with a green center; a symptom of many virus diseases.
- RNA (Ribonucleic acid)*— A nucleic acid involved in protein synthesis; also, the only nucleic acid (genetic material) of many viruses.
- RNase (Ribonuclease)*— An enzyme that breaks down RNA.
- Rosette*— Short, bunched habit of plant growth.
- Rot*— The softening, discoloration, and often disintegration of a succulent plant tissue as a result of fungal or bacterial infection.
- Russet*— Brownish roughened areas on skin on fruit as a result of cork formation.
- Rust*— A disease giving a "rusty" appearance to a plant and caused by one of the Uredinales (rust fungi).
- Salting out*— Precipitation and crystallization of a virus out of suspension by the addition of a salt such as ammonium sulfate.
- Sanitation*— The removal and burning of infected plant parts, decontamination of tools, equipment, hands, etc.
- Saprophyte*— An organism that uses dead organic material for food.
- Scab*— A roughened, crustlike diseased area on the surface of a plant organ. A disease in which such areas form.
- Scion*— A piece of twig or shoot inserted on another in grafting.
- Sclerenchyma*— A strengthening tissue composed of cells with thick and often heavily lignified cell walls.
- Sclerotium*— A compact mass of hyphae with or without host tissue, usually with a darkened rind, and capable of surviving under unfavourable environmental conditions.
- Scorch*— "Burning" of leaf margins as a result of infection or unfavorable environmental conditions.
- Scutellum*— The single cotyledon of grass embryo.
- Secondary infection*— Any infection caused by inoculum produced as a result of primary or a subsequent infection; an infection caused by secondary inoculum.
- Secondary inoculum*— Inoculum produced by infections that took place during the same growing season.

- Sedentary**— Staying in one place; stationary.
- of the male reproductive tract in which sperm is stored temporarily.
- Septate**— Having cross walls.
- Septum**— A cross wall (in a hypha or spore).
- Serology**— A method using the specificity of the antigen-antibody reaction for the detection and identification of antigenic substances and the organisms that carry them.
- Sessile**— Permanently and directly attached; a leaf lacking a petiole or a flower or fruit lacking a pedicel.
- Sexual**— Participating in or produced as a result of a union of nuclei in which meiosis takes place.
- Shock symptoms**— The severe, often necrotic symptoms produced on the first new growth following infection with some viruses; also called acute symptoms.
- Shot-hole**— A symptom in which small diseased fragment of leaves fall off and leave small holes in their place.
- Sieve plate**— Perforated wall area between two phloem cells through which their protoplasts are connected.
- Sieve tube**— A series of phloem cells forming a long cellular tube through which food materials are transported.
- Sign**— The pathogen or its parts or products seen on a host plant.
- Smut**— A disease caused by the smut fungi (Ustilaginales); it is characterized by masses of dark, powdery spores.
- Sooty mold**— A sooty coating on foliage and fruit formed by the dark hyphae of fungi that live in the honeydew secreted by insects such as aphids, mealybugs, scales, and whiteflies.
- Sorus**— A compact mass of spores or fruiting structure found especially in the rusts and smuts.
- Spermogonium (or pycnium)**— A fruiting body of the rust fungi in which the gametes or gametangia are produced.
- Spermatium (or pycniospore)**— The male gamete or gametangium of the rust fungi.
- Spikles**— Small, localized swellings on leaves of certain plants infected with *Ditylenchus dipsaci*.

- Sporangiophore*— A specialized hypha bearing one or more sporangia.
- Sporangiospore*— Nonmotile, asexual spore borne in a sporangium.
- Sporangium*— A container or case of asexual spores.
- Spore*— The reproductive unit of fungi consisting of one or more cells; it is analogous to the seed of green plants.
- Sporidium*— The basidiospore of the smut fungi.
- Sporodochium*— A fruiting structure consisting of a cluster of conidiophores woven together on a mass of hyphae.
- Sporophore*— A hypha or fruiting structure bearing spores.
- Sporulate*— To produce spores.
- Spur*— A short twig on which much of the fruit of many trees is produced.
- Starch*— A polysaccharide consisting of glucose units; the principal food storage substance of plants.
- Stele*— The central cylinder, inside the cortex, of roots and stems of vascular plants.
- Stem-pitting*— A symptom of some viral diseases characterized by depressions of the plant.
- Sterigma*— A slender protruberance on a basidium that supports the basidiospore.
- Sterile fungi*— A group of fungi that are not known to produce any kind of spores.
- Sterilization*— The elimination of pathogens from soil by means of heat or chemicals.
- Stolon*— A hypha of some fungi that grows horizontally along the surface of the substrate.
- Stoma (plural = stomata)*— A minute, organized opening on the surface of leaves or stems through which gasses pass.
- Strand*— A filament. Also, the single or each of the two chains of nucleotides that make up RNA and DNA.
- Strain*— The descendants of a single isolation in pure culture; an isolate. Also a group of similar isolates; a race. In plant viruses: a group of virus isolates having most of their antigens in common.
- Striation*— Linear cuticular depressions.

*Stroma*— A compact mycelial structure on or in which fructifications are usually formed.

*Suberin*— A waxy material found in the walls of cork cells.

*Substrate* — The material or substance on which a microorganism feeds and develops. Also, a substance acted upon by an enzyme.

*Succulent*— A plant having tender, juicy, or watery tissues.

*Suscept*— Any plant that can be attacked by a given pathogen; a host plant.

*Susceptible*— Lacking the inherent ability to resist disease or attack by a given pathogen; nonimmune.

*Susceptibility*— The inability of a plant to resist the effect of a pathogen or other damaging factor.

*Symbiosis*— A mutually beneficial association of two different kinds of organisms.

*Symptom*— The external and internal reactions or alterations of a plant as a result of a disease.

*Symptomless carrier*— A plant which although infected with a pathogen (usually a virus) produces no obvious symptoms.

*Syncytium*— A multinucleate mass of protoplasm surrounded by a common cell wall.

*Synergism*— The concurrent parasitism of a host by two pathogens in which the symptoms or other effects produced are of greater magnitude than the sum of the effects of each pathogen acting alone.

*Systemic*— Spreading internally throughout the plant body; said of a pathogen or a chemical.

*Teliospore*— The sexual, thick-walled resting spore of the rust and smut fungi.

*Telium*— The fruiting structure in which teliospores are produced.

*Terminal oxidation*— The oxidation of respiratory substrates and intermediates by the transfer of electrons (plus  $H^+$  ions) via various carriers to compounds (cytochromes) which are capable of yielding electrons of  $O_2$ , forming  $H_2O$ .

*Tissue*— A group of cells of similar structure which performs a special function.



- Tolerance**— The ability of a plant to sustain the effect of a disease without dying or suffering serious injury or crop loss. Also, the amount of toxic residue allowable in or on edible plant parts under the law.
- Toxicity**— The capacity of a compound to produce injury.
- Toxin**— A compound produced by a microorganism and being toxic to a plant or animal.
- Tracheid**— An elongated, tapering xylem cell, with lignified pitted walls, adapted for conduction and support.
- Transduction**— The transfer of genetic material from one bacterium to another by means of a bacteriophage.
- Transfer RNA (tRNA)**— The RNA that moves amino acids to the ribosome to be placed in the order prescribed by the messenger RNA.
- Transformation**— The change in the DNA of a bacterium by absorption and incorporation of DNA fragments released by another bacterium. Also, the change of a normal to a malignant cell.
- Translocation**— Transfer of nutrients or virus through the plant.
- Transmission**— The transfer or spread of a virus from one plant to another.
- Transovarial transmission**— Transmission of a virus from an adult organism to its progeny through the ovaries and eggs.
- Transpiration**— The loss of water vapor from the surface of leaves.
- Tumor**— A malignant overgrowth of tissue or tissues.
- Tylosis**— An overgrowth of the protoplast of a parenchyma cell into an adjacent xylem vessel.
- Uredium**— The fruiting structure of the rust fungi in which uredospores are produced.
- Uredospore**— A binucleate, repeating spore of the rust fungi.
- Vacuole**— A cavity in the cytoplasm filled with a watery solution of various substances.
- Variability**— The property or ability of an organism to change its characteristics from one generation to the other.

- Vascular**— Term applied to a plant tissue or region consisting of conductive tissue; also, to a pathogen that grows primarily in the conductive tissues of a plant.
- Vector**— An animal able to transmit a pathogen.
- Vegetative**— Asexual; somatic.
- Veinbanding**— Retention of bands of green tissue along the veins while the tissue between the veins has become chlorotic.
- Veinclearing**— Destruction of chlorophyll adjacent or in the vein tissue as a result of infection by a virus or other pathogen.
- Vesicle**— A bubblelike structure produced by a zoosporangium and in which the zoospores are released or are differentiated.
- Vessel**— A xylem element or series of such elements whose function is to conduct water and mineral nutrients.
- Virescent**— A normally white or colored tissue that develops chloroplasts and becomes green.
- Virulence**— The degree of pathogenicity of a given pathogen.
- Virulent**— Capable of causing a severe disease; strongly pathogenic.
- Xylem**— A plant tissue consisting of tracheids, vessels, parenchyma cells, and fibers; wood.
- Wilt**— Loss of rigidity and drooping of plant parts generally caused by insufficient water in the plant.
- Witches' broom**— Broomlike growth or massed proliferation caused by the dense clustering of branches of woody plants.
- Wool**— A mass of desiccated nematodes of *Ditylenchus dipsaci* found in or on some plant tissues.
- Yellows**— A plant disease characterized by yellowing and stunting of the host plant.
- Zoosporangium**— A sporangium which contains or produces zoospores.
- Zoospore**— A spore bearing flagella and capable of moving in water.
- Zygospor**— The sexual or resting spore of zygomycetes produced by the fusion of two morphologically similar gametangia.
- Zygote**— A diploid cell resulting from the union of two gametes.

