11 Common diseases of some economically important crops

In this section the common diseases of a range of vegetable crops and one field crop are recorded to illustrate the diversity of diseases in Vietnam. The diseases listed in each table also provide a checklist to help with observations in the field. The pathogens responsible for many of these diseases can only be diagnosed accurately in the laboratory.

Accurate diagnosis is essential before recommendations can be made on an integrated disease management strategy. For example, fungal root rots can be caused by many pathogens such as species of *Pythium, Phytophthora, Rhizoctonia* and *Phoma*. The appropriate disease management strategy differs between these genera.

A diagram of each crop plant is included to assist the reader in learning where to look for symptoms of each disease.

A thorough understanding of these diseases will assist the reader in their diagnosis of diseases in many other crops.

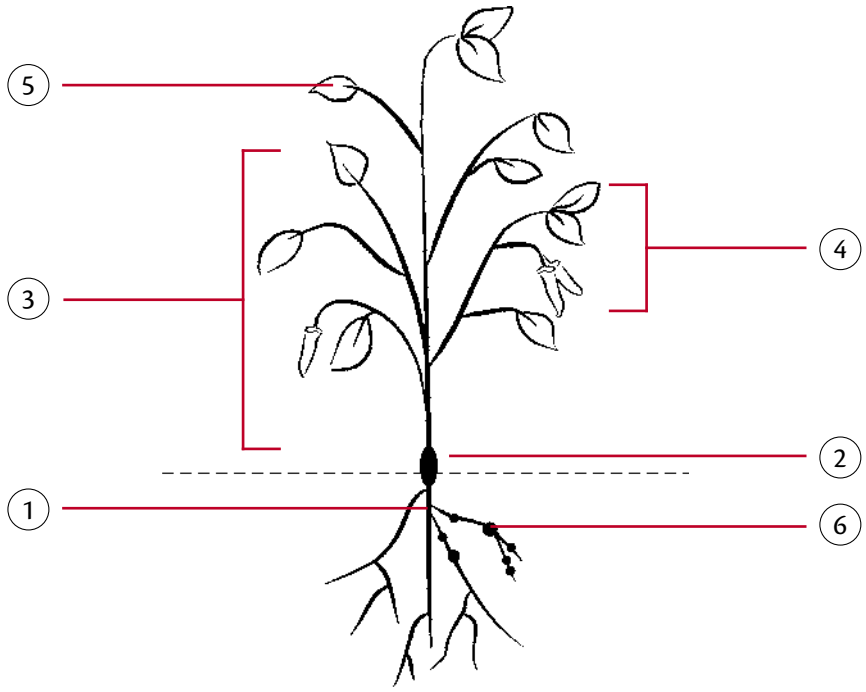
11.1 Common diseases of chilli

Table 11.1 provides a list of the common diseases of chilli in Vietnam (numbers refer to diagram). All diseases may be present in a single crop, and one plant can be affected by one or more of these diseases (Figure 11.1).

Phytophthora root rot, basal stem rot, bacterial wilt, root knot nematode and stem boring insects all cause similar wilting symptoms.

Table 11.1 Common diseases of chilli

Disease	Pathogen	Key diagnostic sign
1 Phytophthora root rot	*Phytophthora capsici*	Root rot and wilt
2 Basal stem rot	*Sclerotium rolfsii*	Small brown round sclerotia and white mycelium on stem base
3 Bacterial wilt	*Ralstonia solanacearum*	Bacterial ooze in stem, stem browning
4 Anthracnose	*Colletotrichum* sp.	Black sunken lesion
5 Viral disease	Plant virus	Dwarfing of younger leaves
6 Root knot nematode	*Meloidogyne* sp.	Galls on roots



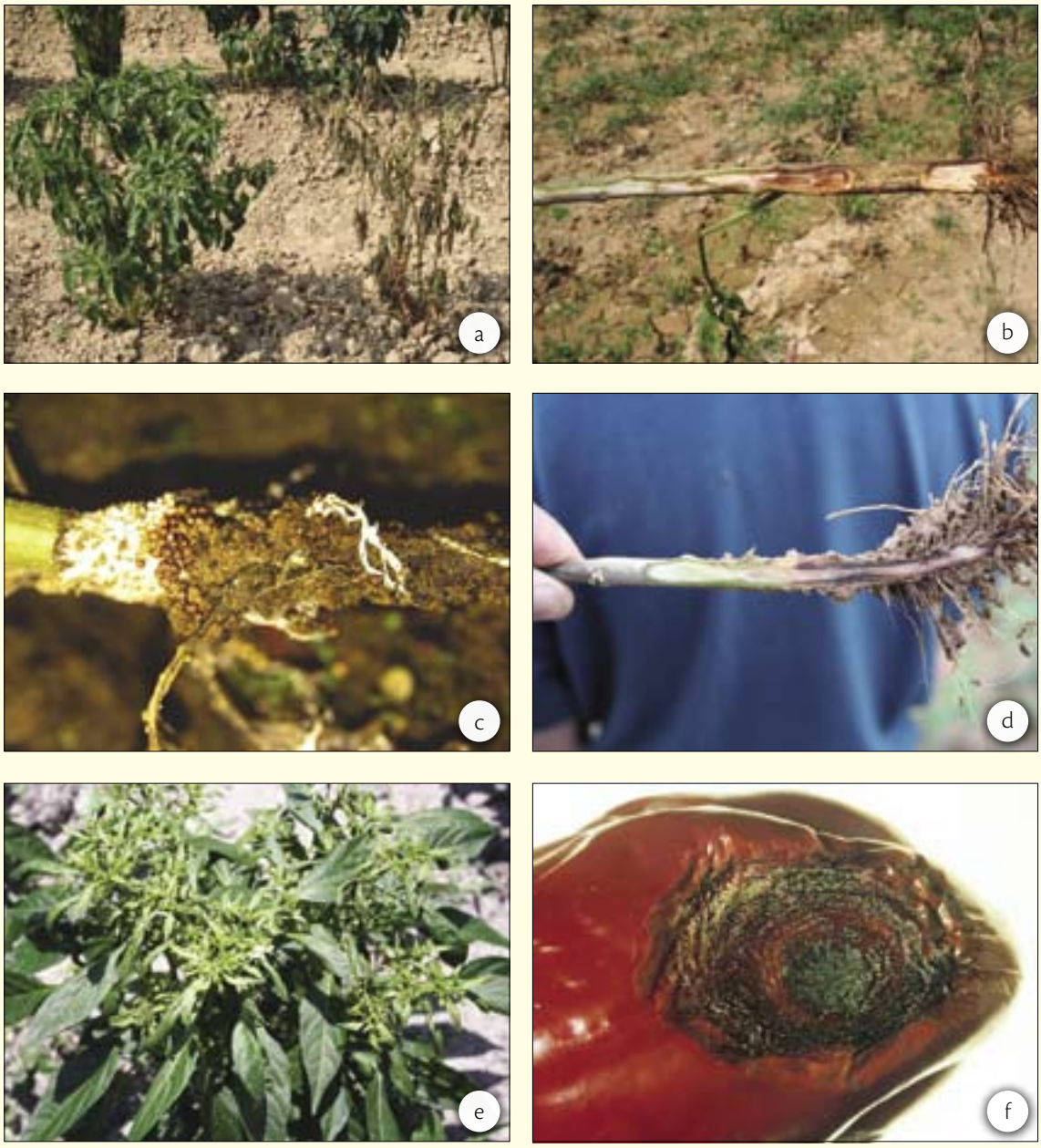


Figure 11.1 Diseases of chilli: (a) healthy chilli plant (left) and wilted (right), which can be caused by several diseases, (b) stem browning, a typical symptom of bacterial wilt caused by *Ralstonia solanacearum*, (c) basal rot caused by *Sclerotium rolfsii*, (d) Phytophthora root rot caused by *Phytophthora capsici*, (e) chilli affected by tomato spotted wilt virus, (f) chilli fruit affected by anthracnose, caused by *Colletotrichum* sp.

11.2 Common diseases of tomato

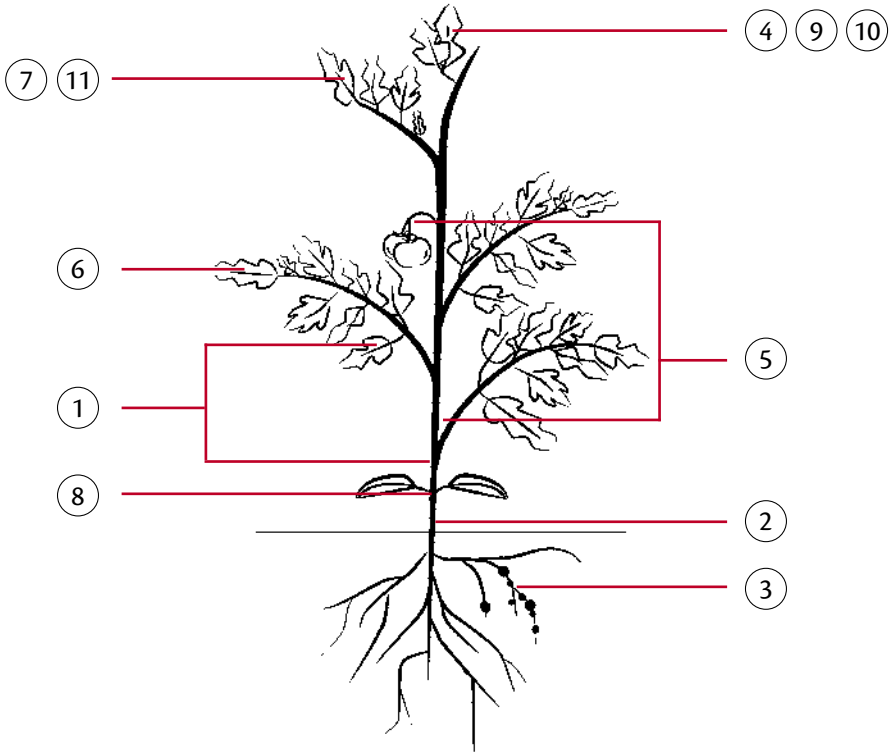
Tomato is susceptible to a very wide range of diseases (Table 11.2). There is a need for more disease surveys of tomatoes in Vietnam to identify all the serious diseases present. In particular, diagnostic studies are needed on the viruses and bacterial pathogens on tomato.

Tomato crops in Vietnam are commonly affected by several diseases. Individual plants can be affected by more than one disease, which can make diagnosis difficult (Figure 11.2).

Table 11.2 Common diseases of tomato

Disease		Pathogen	Key diagnostic sign
1	Bacterial wilt	*Ralstonia solanacearum*	Wilt, bacterial ooze in stem, stem browning
2	Basal stem rot	*Sclerotium rolfsii*	Small brown round sclerotia and white mycelium on stem base
3	Root knot nematode	*Meloidogyne* sp.	Wilt, galls on roots
4	Late blight	*Phytophthora infestans*	Grey fungal growth on underside of leaf
5	Bacterial canker[a]	*Clavibacter michiganensis*	Leaf yellowing, wilting, stem browning, fruit spotting
6	Bacterial speck[a]	*Pseudomonas syringae*	Necrotic spots on leaves
7	Tomato spotted wilt virus[a]	Virus	Small areas of browning (bronzing) on young leaves, dark spots or rings on old leaves
8	Fusarium wilt[a]	*Fusarium oxysporum* f. sp. *lycopersici*	Wilt, vascular stem browning
9	Target spot/early blight	*Alternaria solani*	Concentric circular black lesions on leaves
10	Leaf mould	*Cladosporium fulvum (Fulvia fulva)*	Grey/purple fungal growth on underside of leaf
11	Yellow top virus	Virus	Small yellow curled leaves

a The presence of these pathogens in Vietnam needs to be confirmed.



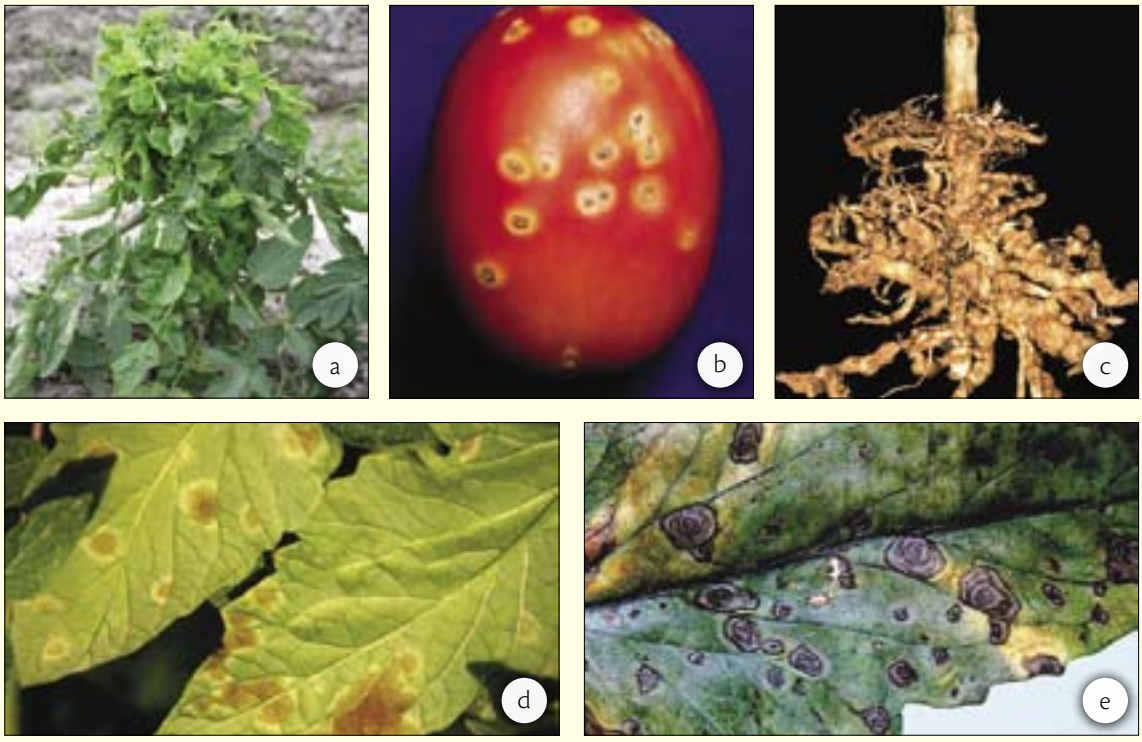


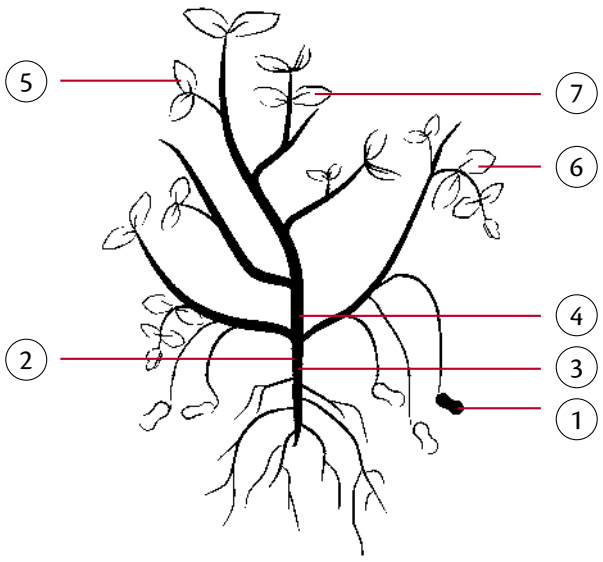
Figure 11.2 Tomato diseases: (a) tomato showing symptoms of yellow leaf curl virus in new growth, (b) tomato fruit showing bacterial speck lesions caused by *Pseudomonas syringae*, (c) root knot nematode caused by *Meloidogyne* sp., (d) velvet leaf spot caused by *Cladosporium fulvum*, (e) target spot caused by *Alternaria solani*

11.3 Common diseases of peanut

Peanuts are susceptible to root, pod, stem and leaf diseases (Table 11.3 and Figure 11.3). The root and pod rot diseases need more diagnostic research to determine the key pathogens involved.

Table 11.3 Common diseases of peanut

Disease	Pathogen	Key diagnostic sign
1 Root and pod rot	*Pythium/Rhizoctonia*	Seedling death/root rot Yellowing and wilting Stunting Browning of lateral roots mid-season Tap-root rot late in season and pod rot
2 Basal stem rot	*Sclerotium rolfsii*	Small brown round sclerotia and white mycelium on stem base
3 Crown rot	*Aspergillus niger*	Stunting and wilting Black mycelium and spores on stem base and cotyledons
4 Stem rot	*Sclerotinia sclerotiorum*	Wilting, wet rot of stems and leaves, large black sclerotia
5 Rust	*Puccinia arachidis*	Reddish rust pustules on leaves
6 Cercospora leaf spot	*Cercospora arachidicola*	Dark chocolate brown lesions
7 Mosaic virus	Virus	Mosaic, laboratory diagnosis required



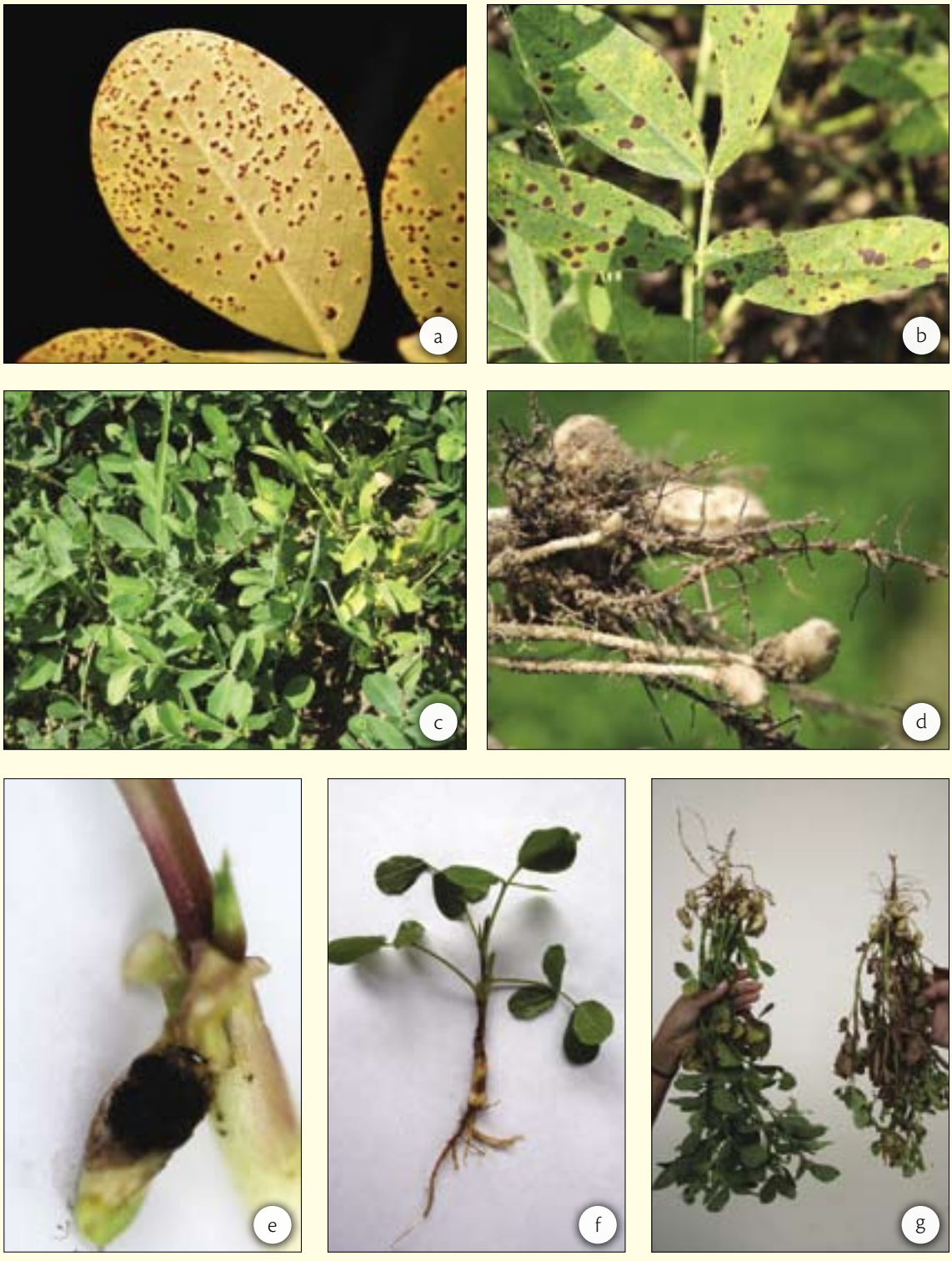


Figure 11.3 Peanut diseases: (a) peanut rust caused by *Puccinia arachidis*, (b) Cercospora leaf spot (*Cercospora arachidicola*) and rust, (c) peanuts affected by root rot showing yellowing and stunting symptoms, (d) feeder root rot and pod rot caused by *Pythium* sp., (e) necrotic peanut cotyledon showing abundant sporulation of the pathogen *Aspergillus niger*, (f) Pythium root rot on peanut seedling, (g) healthy peanut plant (left) and stunted root rot affected plant (right)

11.4 Common fungal diseases of onions

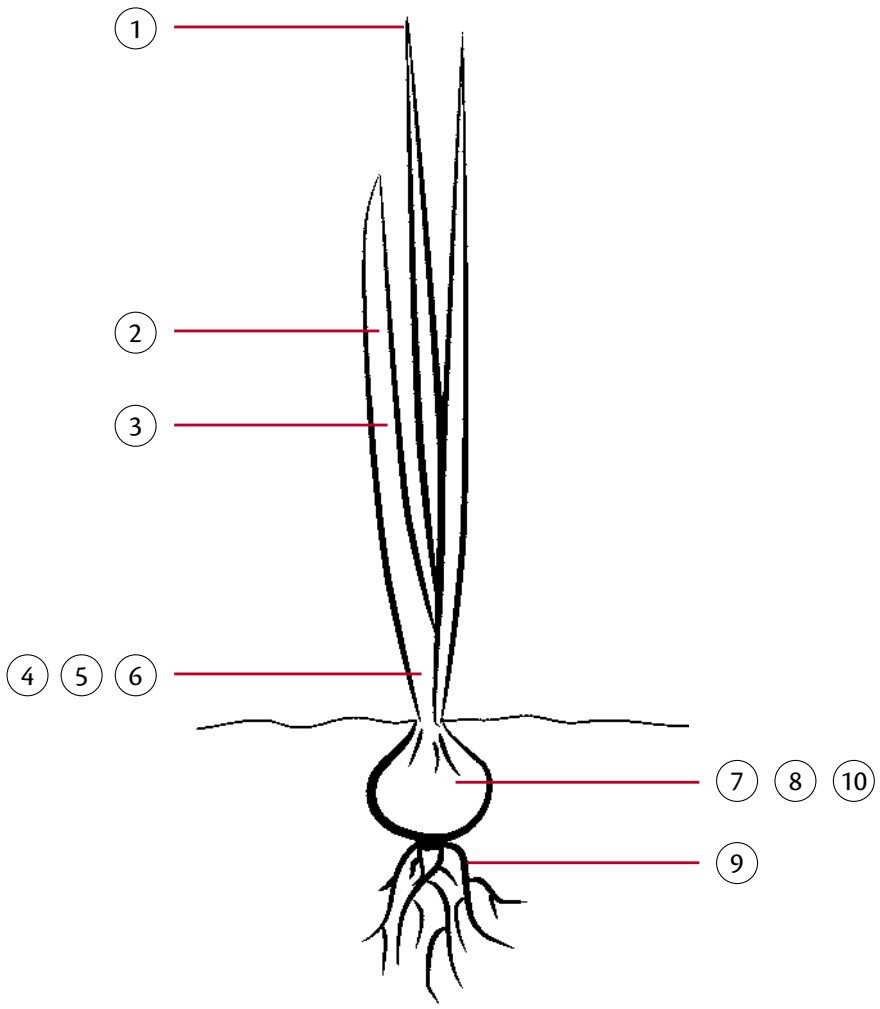
Onions are affected by a wide range of fungal diseases of the leaves, bulb and roots (Table 11.4). Most of the fungal pathogens can be isolated on culture media relatively easily. Note that downy mildew is an obligate fungal pathogen and cannot be grown on artificial culture media.

The diseases listed in Table 11.4 have distinctive symptoms and can usually be distinguished readily in the field, and then confirmed in the laboratory. The fungi which cause bulb rots can continue to cause problems during storage.

Table 11.4 Common fungal diseases of onions

Disease	Pathogen	Key diagnostic sign
1 Tip blight	*Colletotrichum* sp.	Brown-white tip, acervuli present
2 Downy mildew	*Peronospora* sp.	Grey fungal growth
3 Stemphylium leaf spot	*Stemphylium* sp.	Target-like leaf spot
4 Neck rot	*Botrytis byssoidea*	Grey-brown fungal growth and spore masses on bulb
5 White rot	*Sclerotium rolfsii*	White mycelium and brown sclerotia on stem base
6 Leaf base (wet) rot	*Sclerotinia sclerotiorum*	White mycelium, large black sclerotia
7 Fusarium rot	*Fusarium* spp.	White to pale violet mycelium, no sclerotia
8 Black mould (bulb rot)	*Aspergillus niger*	Black powdery spore masses (also a storage rot)
9 Pink root rot	*Phoma terrestris* (*Pyrenochaeta terrestris*)	Pink roots and pink outer scales
10 Bulb rot	*Rhizopus stolonifer* (*R. nigricans*)	Extensive cottony fungal growth with obvious black sporangia

Onions are also affected by bacterial leaf blights, bacterial bulb rots, a number of plant viruses, and several nematode diseases of the roots (Figure 11.4). Nematode diseases mainly cause stunting and rarely lead to plant death, so these are commonly overlooked.



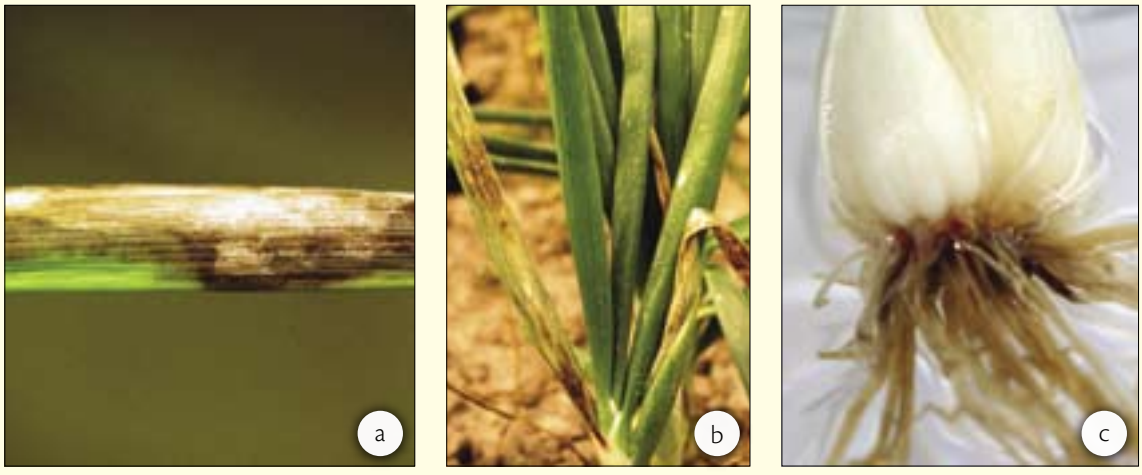


Figure 11.4 Diseases of onion: (a) Stemphylium leaf spot, (b) downy mildew caused by *Peronospora* sp., (c) symptoms of pink root rot caused by *Phoma terrestris*

11.5 Common fungal diseases of maize

Maize is strongly recommended for rotation with vegetable crops for the control of many pathogens which survive in soil. Maize is resistant to bacterial wilt (*Ralstonia solanacearum*), *Sclerotinia sclerotiorum*, most common *Phytophthora* species, and root knot nematode. However, it is susceptible to common species of *Pythium* and moderately susceptible to *Sclerotium rolfsii* and *Rhizoctonia* spp. (Table 11.5 and Figure 11.5) Maize is also susceptible to stalk and cob rots caused by several *Fusarium* species but these do not normally affect vegetable crops. A more exhaustive list of maize diseases can be found on the internet (http://www.cimmyt.org/english/docs/field_guides/maize/diseases.htm).

Table 11.5 Common fungal diseases of maize

Disease		Pathogen	Key diagnostic signs
1	Common (boil) smut	*Ustilago maydis*	Large white galls replace kernels, black spore masses; can also infect the tassel and stalk.
2	Fusarium stalk, cob and root rots	*Fusarium graminearum*	Stalks rot internally usually with 'shredded' appearance of pith. Pink to red pigments and hyphal growth may be present in rotted stalks and cobs.
		Fusarium verticillioides *Fusarium sublutinans* *Fusarium proliferatum*	Stalks rot internally usually with 'shredded' appearance of pith. Pith usually pigmented violet to purple. White mycelium develops on diseased cobs under hulls.
3	Common rust	*Puccinia sorghi*	Elongated necrotic pustules forming on leaves.
4	Rhizoctonia leaf, stalk and root rots	*Rhizoctonia* spp.	Causes large irregular pale-brown lesions on leaves and stalk. Brown irregular-shaped sclerotia usually present on diseased areas.
5	Southern leaf blight	*Bipolaris maydis* (*Cochliobolus heterostrophus*)	Necrotic lesions form on leaves.
6	Turcicum leaf blight	*Exserohilum turcicum*	Small oval water-soaked lesions on leaves changing to larger necrotic lesions.
7	Pythium stalk and root rot	*Pythium* spp.	Wet rot of stalk tissues and brown lesions on roots.
8	Downy mildews	*Peronosclerospora* spp. *Sclerospora* sp. *Sclerophthora* spp.	Grey fungal growth (sporangiophores) on underside of leaf.