



22.1 Angular leaf spot; lesions delimited by veins, centers may fall out.



22.4a Black root rot; pale brown to black lesions.



22.4b Black root rot; roots with small, black sclerotia of *Phomopsis sclerotoides*.



22.7a Crown and root rot; orange-brown stem rot caused by *Pythium* sp. on cucumber grown in sawdust.



22.7b Damping-off; affected plant, showing constriction of stem near soil line.



22.7c Crown and root rot; orange-brown pythium rot may extend 10 cm up the stem.



22.7d Crown and root rot; sudden wilting may be first symptom noted.



22.8a Downy mildew; angular, chlorotic mottle on upper leaf surface.



22.8b Downy mildew; purple-brown sporangiophores of *Pseudoperonospora cubensis* on lower leaf surface.



22.9a Fusarium wilt; basal stem lesion.



22.9b Fusarium wilt; advanced wilt symptoms.



22.10a Gray mold; affected fruit with sporulation of *Botrytis cinerea*.



22.10b Gray mold; stem lesion with dark gray spores of *Botrytis cinerea*.



22.10c Gray mold; an infected leaf petiole.



22.10d Gray mold; sclerotia of *Botrytis cinerea* on an infected cucumber stem.



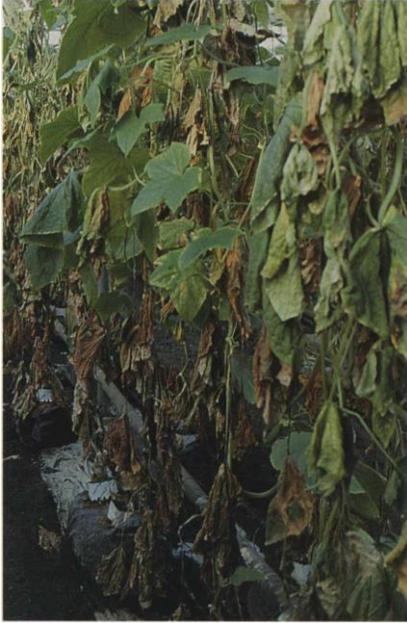
22.11a Gummy stem blight; stem canker with dark pycnidia of *Ascochyta cucumis*.



22.11b Gummy stem blight; a stem canker with droplets of amber- colored ooze on the surface.



22.11c Gummy stem blight; stem canker with dark pseudothecia of *Didymella bryoniae*.



22.11d Gummy stem blight; wilted plants.



22.11e Gummy stem blight; fruit with black *Ascochyta cucumis* pycnidia at blossom end.



22.12a Alternaria leaf blight; severely affected leaves.



22.12b Alternaria leaf blight; lesions on honeydew melon leaf.



22.13 Leaf rot (pink mold rot); lesions on affected leaves.



22.14a Penicillium stem rot; stem lesion, usually only at pruned nodes.



22.14b *Penicillium* stem rot; lesions on fruit, note blue-gray sporulation.



22.15a Powdery mildew; leaf symptoms with whitish fungal growth.



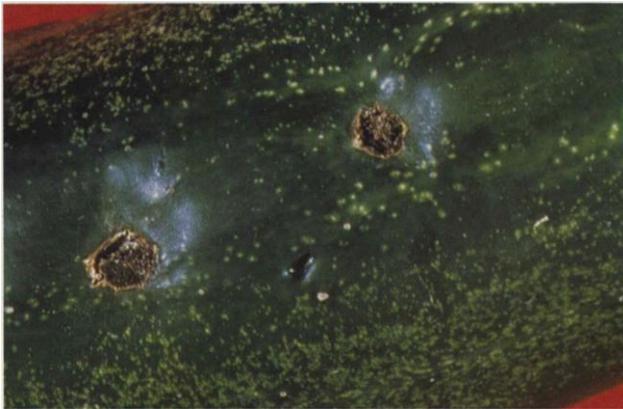
22.15b Powdery mildew; severely affected plant.



22.15c Powdery mildew; fruit infection of long English cucumber.



22.15d Powdery mildew; cleistothecia of *Erysiphe cichoracearum* on cucumber petiole.



22.16 Scab; raised, corky lesions on fruit.



22.17a Verticillium wilt; wilting and chlorosis begin on lower leaves.



22.17b Verticillium wilt; characteristic V- shaped lesions on leaf.



22.18a White mold; stem infection; note bleached appearance.



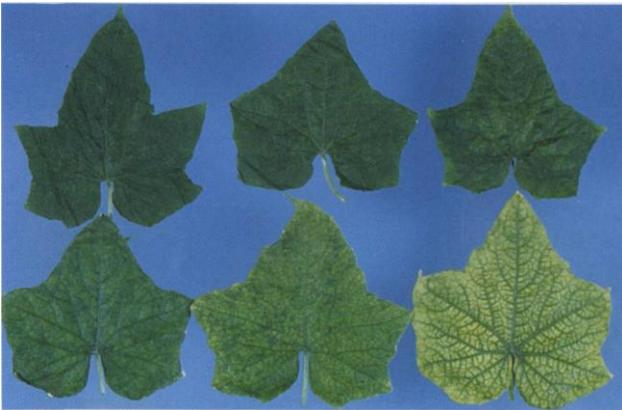
22.18b White mold; stem lesions with cottony white mycelium of *Sclerotinia*.



22.18c White mold; fruit infection.



22.18d White mold; advanced decay with white mycelium and black sclerotia.



22.19 Beet pseudo-yellows; interveinal chlorosis and yellowing of leaves.



22.20a Cucumber mosaic; severe mottling on leaves.



22.20b Cucumber mosaic; fruit mottling.



22.22 Cucumber pale fruit; pear-shaped distortion of fruit.



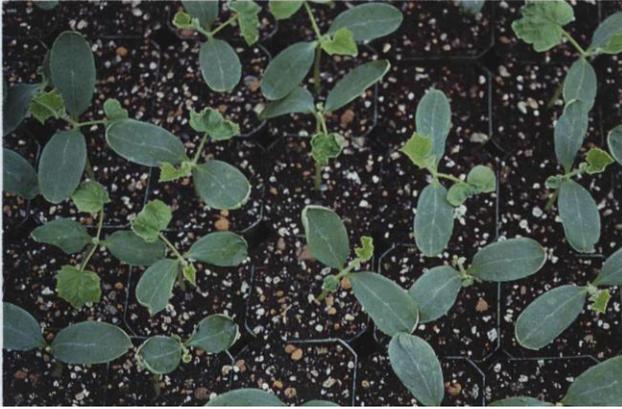
22.23 Watermelon mosaic; mosaic and distortion of a young leaf.



22.24a Zucchini yellow mosaic; leaf puckering.



22.24b Zucchini yellow mosaic; mosaic and distortion of leaves and fruit.



22.25a Cold injury; leaf puckering of cucumber seedlings from applying cold water.



22.25b Chilling injury; scarring and curvature of fruit caused by cold storage.



22.26a Boron deficiency; healthy (left); note skin cracking on affected fruit.



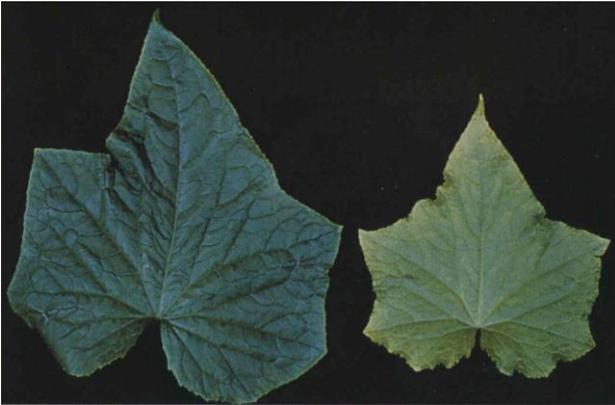
22.26b Magnesium deficiency; chlorotic flecking on leaves.



22.26c Molybdenum deficiency; leaf scorch symptoms.



22.26d Iron deficiency; healthy (left); young affected leaves show severe interveinal yellowing.



22.26e Nitrogen deficiency; healthy (left); affected young leaves are small and pale yellow-green.



22.26f Nitrogen deficiency; affected small fruit (top) has a pointed blossom end.



22.26g Potassium deficiency; chlorosis of leaf margins may be followed by bronzing and scorching.



22.28 Root death; browning of cucumber roots growing in an NFT system.



22.30a Southern root-knot nematode; stunted (center) and healthy plants.



22.30b Southern root-knot nematode; severely wilted cucumber plants.



22.30c Southern root-knot nematode; galls on roots of greenhouse cucumber.



22.30d Northern root-knot nematode; healthy (left) and infested roots.



22.31a Fungus gnat; pupae.



22.31b Fungus gnat; adults and larvae; adult 2-3 mm long.



22.31c *Hypoaspis* sp.; a mite predator of fungus gnats and western flower thrips.



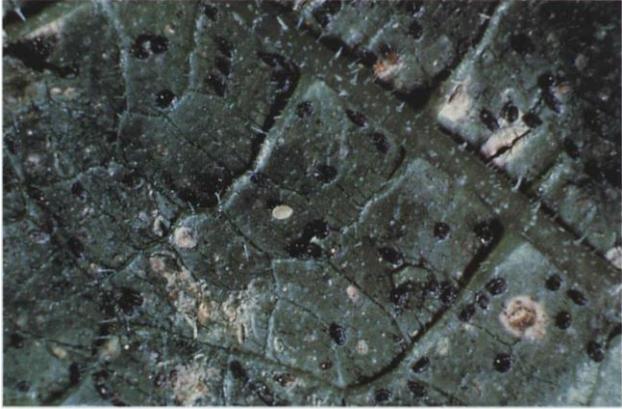
22.32a Greenhouse whitefly; adult-infested leaf.



22.32b Black sooty mold; on honeydew produced by greenhouse whitefly.



22.32c Greenhouse whitefly; adult; length \pm 1.5 mm.



22.32d Greenhouse whitefly; black scales are pupae parasitized by *Encarsia formosa*, note a healthy (white) pupa in center.



22.33a Melon aphid; winged adult.



22.33b Melon aphid; wingless adult and nymphs.



22.34a Western flower thrips; leaf damage and frass (black dots).



22.34b Western flower thrips; fruit scarring resulting from feeding injury.



22.34c Western flower thrips; fruit curvature resulting from feeding injury.



22.34d Western flower thrips; yellow sticky traps for monitoring thrips and greenhouse whitefly in a greenhouse cucumber crop.



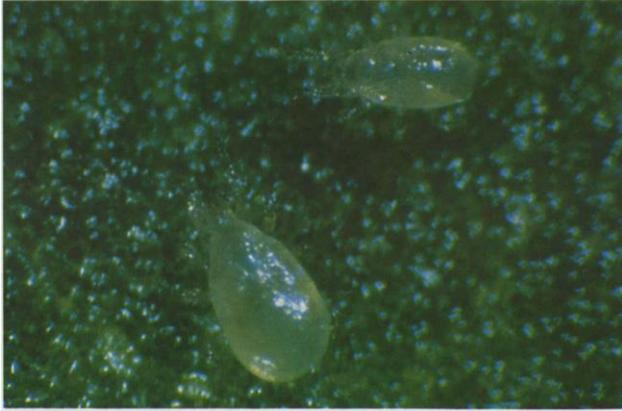
22.34e Western flower thrips; early propupa; note wing buds and eye pigmentation (see also *18.42j*).



22.34f Western flower thrips; pupa.



22.34g Western flower thrips; adult; length 1-2 mm.



22.34h *Amblyseius cucumeris*; a mite predator of western flower thrips.



22.34i Minute pirate bug; predator of western flower thrips; length 3-5 mm.



22.35a Chrysanthemum leafminer; leaf damage.



22.35b Chrysanthemum leafminer; adult flies on cotyledons of cucumber.



22.35c Onion thrips; adult on cucumber leaf; length 1.0-1.2 mm.



22.35d Plant bug; adult *Lygus* sp.; length 2-10 mm.



22.36a Two-spotted spider mite; damage to leaves.



22.36b Two-spotted spider mite; leaf yellowing from feeding injury.



22.36c Two-spotted spider mite; infested leaf, showing silvering and mites in webbing.



22.36d Two-spotted spider mite; winter phase (red-orange) on cucumber leaves.



22.36e Two-spotted spider mite; adult, summer phase (pale green).



22.36f Two-spotted spider mite; adult, winter phase (red-orange).



22.36g *Phytoseiulus persimilis*; a mite predator of two-spotted spider mite.



23.6a Damping-off; a severely affected seedling.