Fungal Diseases and Parasitic Nematodes

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Dr Kate Entwistle

Graduated in 1986 (plant pathology, physiology & microbiology)

Awarded PhD in 1995

Worked exclusively in turfgrass pathology since 1990

Member of professional and academic organisations Independent Director of the Institute of Groundsmanship

The Turf Disease Centre

Set up in 2000 to provide independent advice and analysis service Also provides site visits, education, collaboration on research

Work with all amenity turf areas, have clients worldwide, presentations at National Conferences, for companies and associations

Support independent turfgrass consultants and companies Working relationships with researchers worldwide.

Turf Diseases are Caused by Pathogens

Why and how do pathogens cause disease?

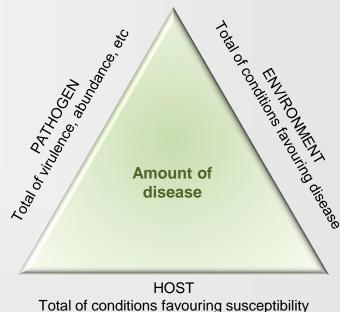
Overview of the diversity of turf disease

PATHOGEN = FUNGUS

BACTERIA, FUNGUS-LIKE ORGANISMS, NEMATODES,

BLUE-GREEN ALGAE!!!

How do pathogens cause disease?



Total of conditions favouring susceptibility

Inoculation, penetration, infection & colonisation, dissemination, survival

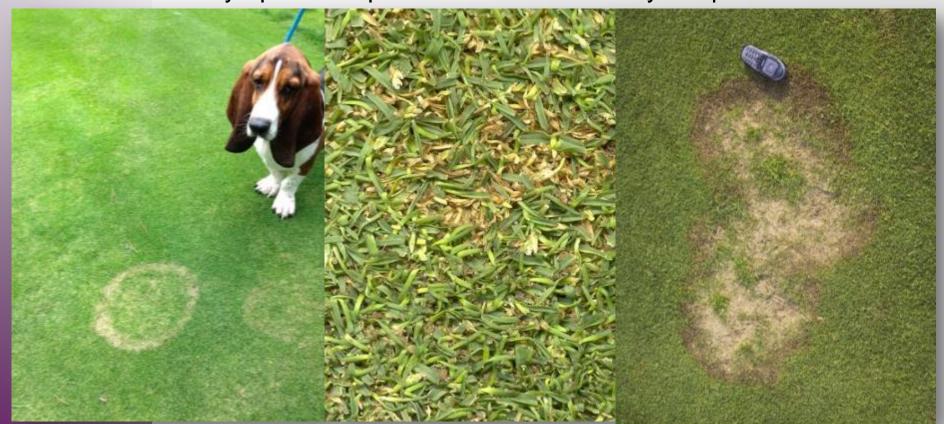
During infection, pathogen releases biologically active substances and the host reacts with a variety of defence mechanisms.

> Some infections remain latent. During colonisation, symptoms are expressed.

Fungal Diseases

Fungi can infect leaf, stem, crown or root tissues

Symptoms expression is influenced by the point of infection





mycelium, lesions, spore producing structures, decay of plant tissues

Also, notice how the symptoms are developing

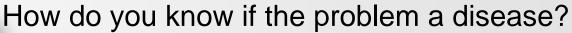
The development of symptoms helps to identify the cause

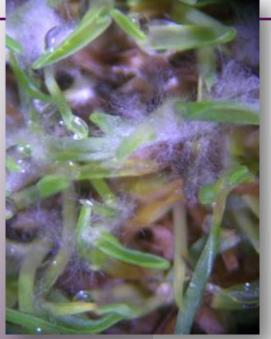
Patches or rings appear and remain unchanged in size e.g. Fairy Ring, Take-all Patch

Patches or rings appear and increase in size / number e.g. Rhizoctonia diseases, Microdochium Patch, Dollar Spot, Snow Mold

Symptoms appear as irregular areas e.g. Anthracnose, Red Thread

Symptoms appear as a general effect e.g. Rust, Leaf Spot





- Smell the rootzone
- Incubate turf in plastic bag
- Cut the profile cleanly to depth
- Use water drop test for repellence





Disease investigation

Look at what grass is affected and how it's affected

Find out when symptoms first appeared & how they have changed

Do the symptoms appear annually or several times / year?

Did the symptoms develop after a maintenance procedure?

Environmental Conditions Affect Development

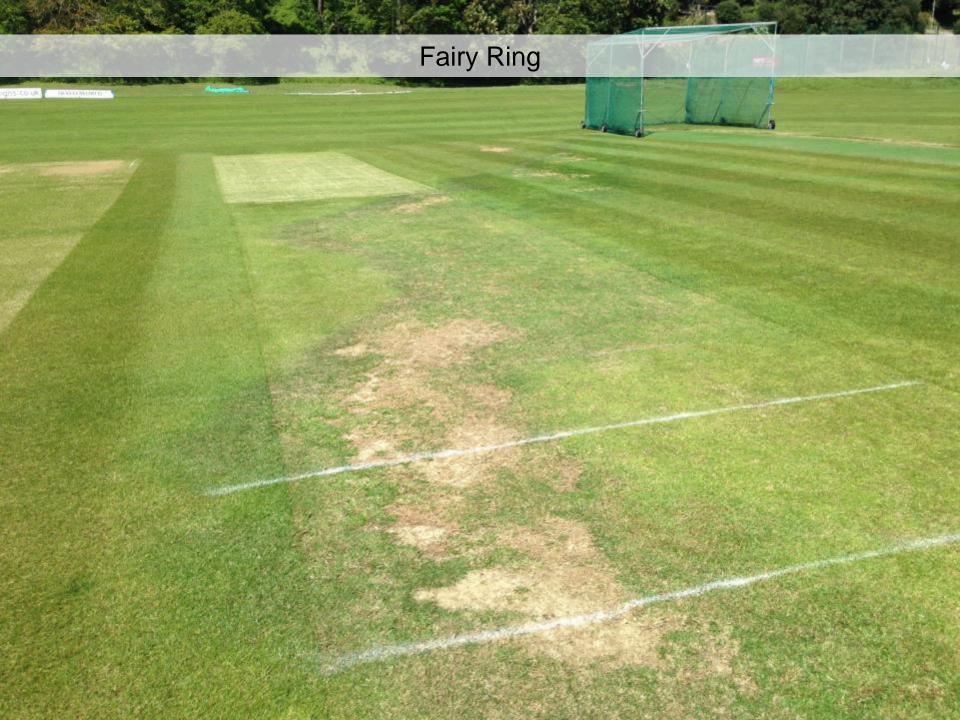
Weather and rootzone conditions

Piece together all information to help narrow down the potential cause of the disease

Keep an open mind – the problem may not be fungal!













Superficial Fairy Ring?

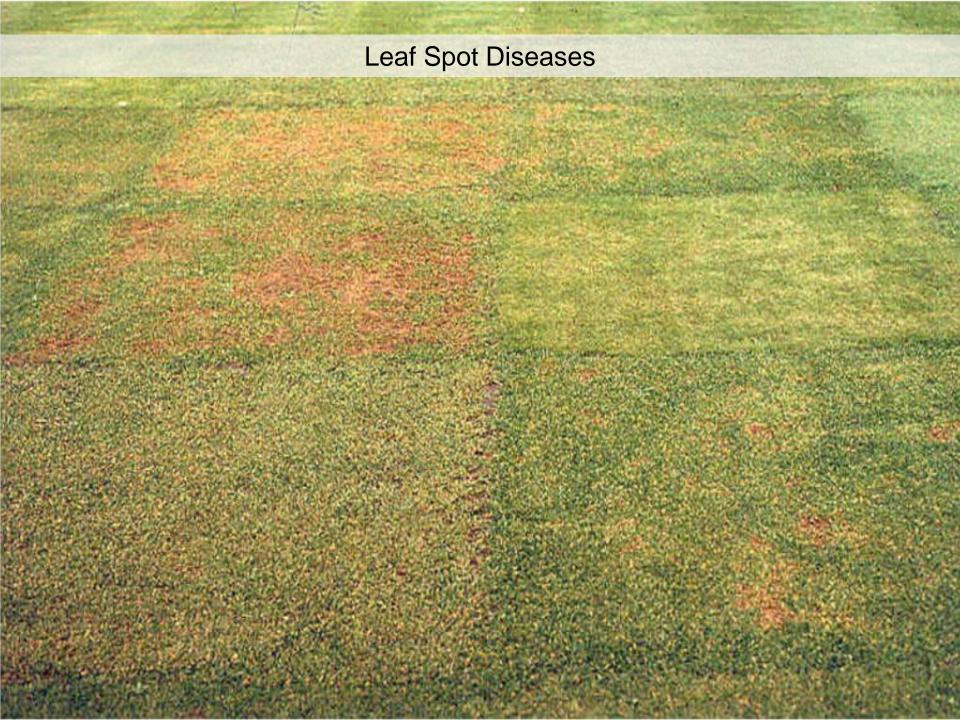
Brown Patch / Rhizoctonia Blight



Microdochium Patch, Microdochium nivale



Snow Mold, Typhula spp



Leaf Spot Diseases



Rust Diseases

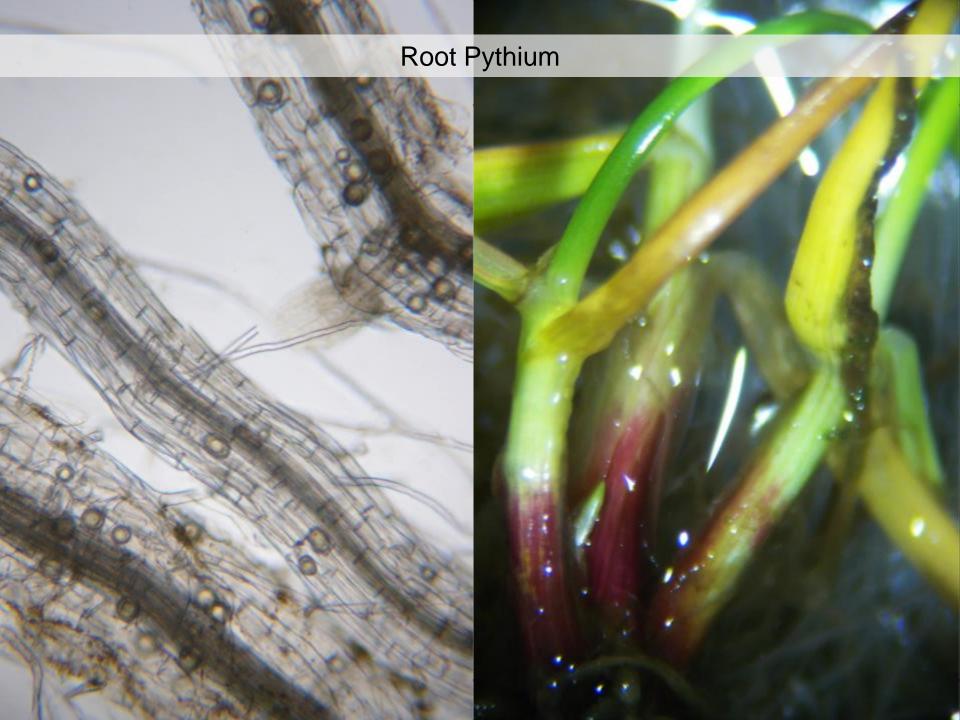


Dollar Spot





Yellow Tuft, Sclerophthora macrospora





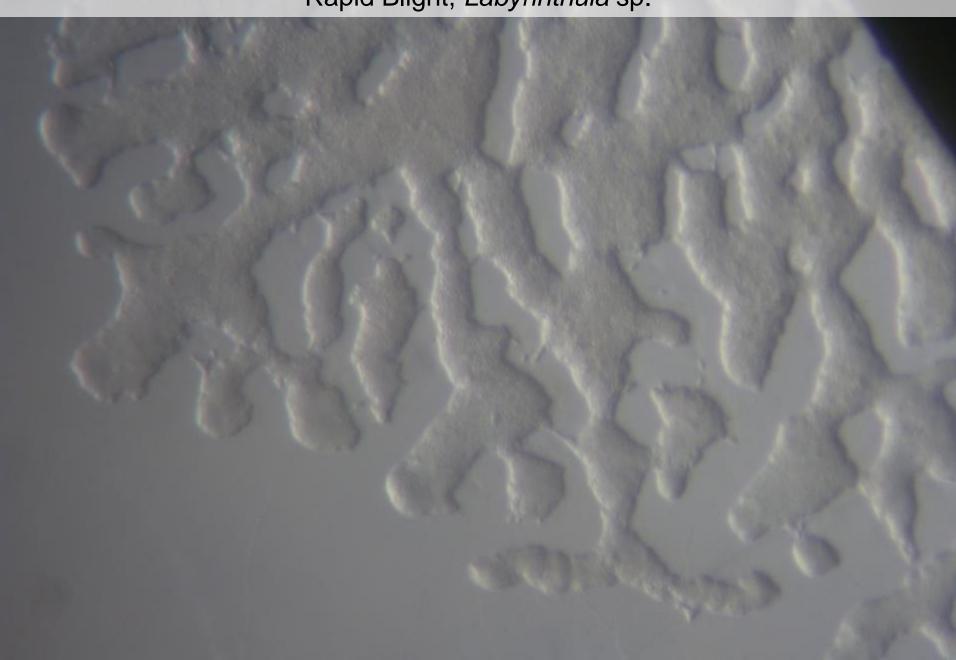


Poa and Pearlwort (Sagina procumbens)





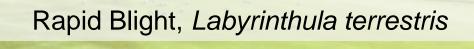
Rapid Blight, Labyrinthula sp.







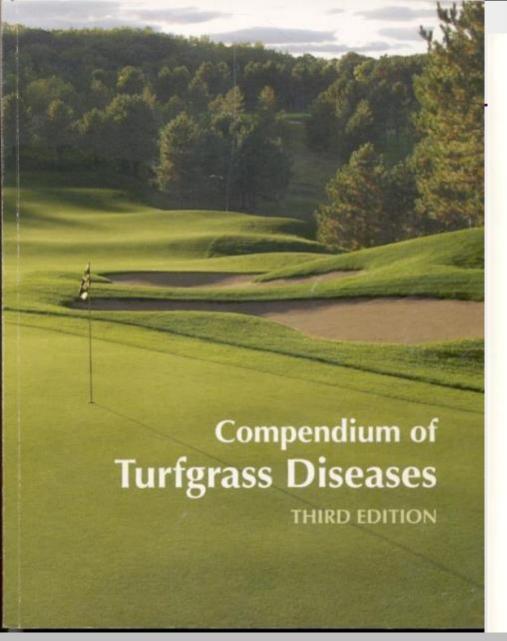
Rapid Blight, Labyrinthula terrestris



Laser Poa trivialis

Seaside II bentgrass

Photo: Dr Mary Olsen, Uni Arizona



Compendium of Turfgrass Diseases

THIRD EDITION

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Oregon State University Culumbia Basin Agricultural Research Center Penalistim

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University of Maryland College Park

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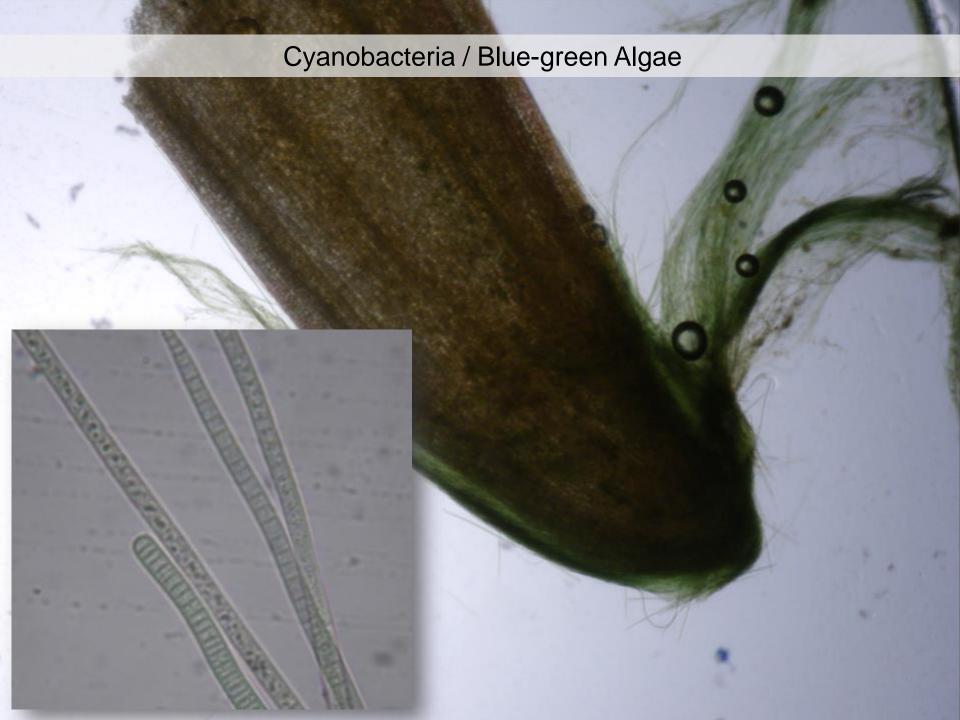
Cyanobacteria / Blue-green Algae RUST-OLEUM

Cyanobacteria / Blue-green Algae \$0 30 40 50 60 70 80 30 100 10 50 60 70 80

Cyanobacteria / Blue-green Algae











Plant Parasitic Nematodes

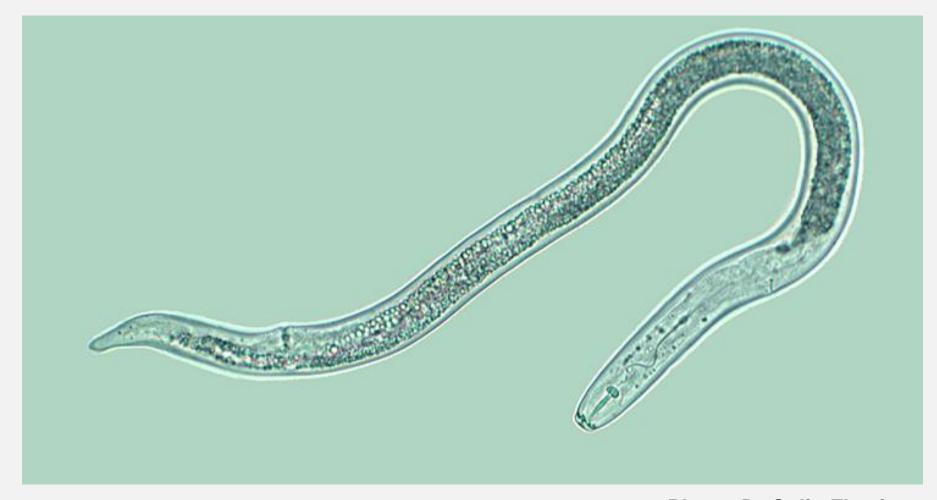


Photo: Dr Colin Fleming Agri-Food and Biosciences Institute, Northern Ireland

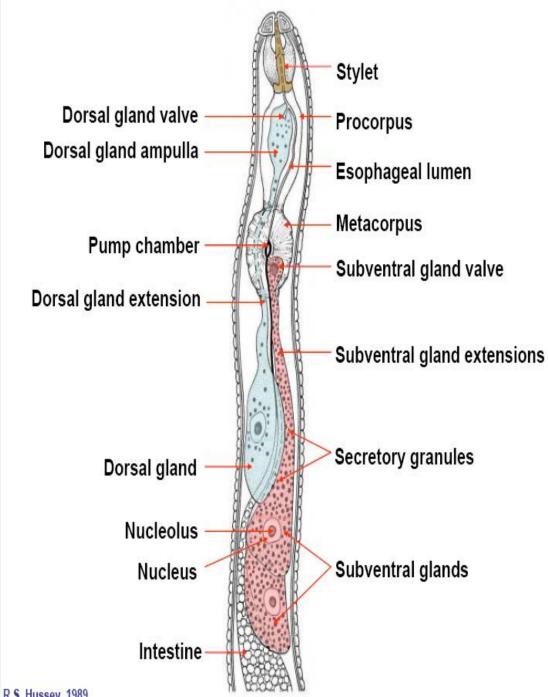
Length from 0.03 to 5 mm

Very thin

Can't be seen without magnification.

Mostly vermiform but some females are swollen at maturity

Egg, 4 x juveniles (J1-J4), adult



R.S. Hussey, 1989

Large and diverse group of unsegmented roundworms, 0.1mm to 6m in length.

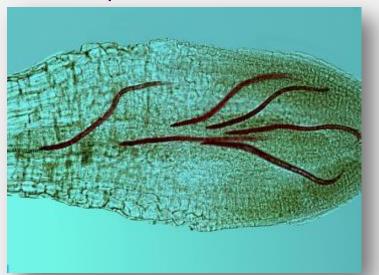
They are free-living and parasites.

Economically, the most important nematodes are plant parasitic. About 4000 nematode species attack plant roots, stems or leaves.



Two main types of plant parasitic nematode:

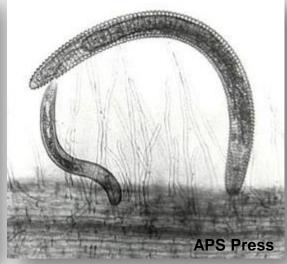
Endoparasites: these live in the plant and feed internally





Ectoparasites: these live in the rootzone





Host – Parasite Relationship

Modifications occur within the plant as a result of infection by the nematode

Modifications can be: Morphological or physiological

Paratrichodorus – feeding results in lack of root hairs and roots become almost non-functional with respect to absorption of water and minerals

Generally, migratory ecto-parasites don't cause specific changes in the host.

Semiendo- and endo-parasites do.

Identify plant parasitic nematodes by symptoms

Heavy infections can cause root lesions, root rot, root pruning, root galls, stubby roots, cessation of root growth

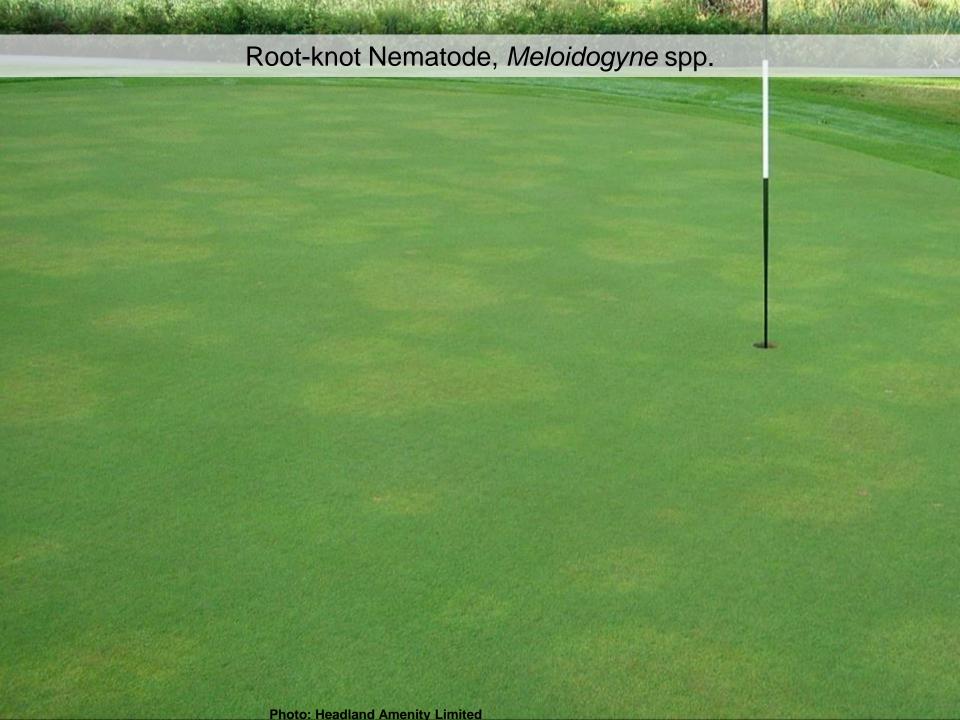
Damaged roots can't absorb water and nutrients

Affected turf in irregular patches shows reduced growth, foliage discolouration or chlorosis, thinning

Poor stability in soccer and horse racing

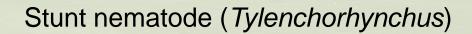
Wilting, especially under accelerated transpiration

Distribution may be patchy











The key to effective turf disease management is....

.....ACCURATE IDENTIFICATION

Now that you know what the problem is, you can manage it

Integrated Disease Management

Biostimulants, seaweed, Harpin protein

Thank you

Questions

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