

Rijk Zwaan
North America



Spinach Diseases

Sharing a healthy future





Crop specialists

United States
Eric Christianson
e.christianson@rijkszwaan.com

Italy
Paride Zamagna
p.zamagna@rijkszwaan.it

Spain babyleaf
Santiago Gaston de Iriarte
Dupuy de Lome
s.gaston@rijkszwaan.es

Spain industry
Javier Arbizu Lumbier
j.arbizu@rijkszwaan.es

Australia
Rob Philip
r.philip@rijkszwaan.com.au

Turkey
Deniz Karayol
c.karayol@rijkszwaan.com.tr

United Kingdom
Gerard van der Hut
g.van.der.hut@rijkszwaan.co.uk

Germany babyleaf
Jurgen Parschau
j.parschau@rijkszwaan.de

Germany industry
Friedel Peil
f.peil@rijkszwaan.de

Japan
Yoshio Yunoki
yyunoki@takadaseed.com

China
Wei Wang
w.wang@rijkszwaan.cn

Crop coordinators

Industry
Johan Decroos
j.decroos@rijkszwaan.com

Babyleaf
Wim in 't Groen
w.in.t.groen@rijkszwaan.nl

Oriental
Erwin Weerheim
e.weerheim@rijkszwaan.nl

Dear Customer,

We are pleased to present to you our spinach disease booklet. As an industry we are all working together to reduce the disease pressure. Early recognition of the right disease helps to take the right measures at the right time.

In this booklet you find some clear pictures and descriptions of the most common diseases in spinach.

With hope it supports you to further reduce the disease pressure and to be able to grow a healthy crop.

Crop team Spinach
Rijk Zwaan



Damping off



Pythium

Pythium aphanidermatum (most common)

Symptoms

- Mainly damping off right after germination
- Dark Brown/black root
- Radicles and cotyledons may become brown and soft after germination
- Water-soaked, greasy lesions may also form on hypocotyls and roots



To avoid

- Poorly draining soils
- Frequent spinach production on same soil
- Solid soil texture
- Sensitive cultivars



Fusarium

Fusarium oxysporum f. sp. *spinaciae*

Symptoms

- General wilting from seedling until adult stages
- Green hartleaves
- Black root points
- Host plant
Chenopodiaceae
- Will stay in the soil for several years



To avoid

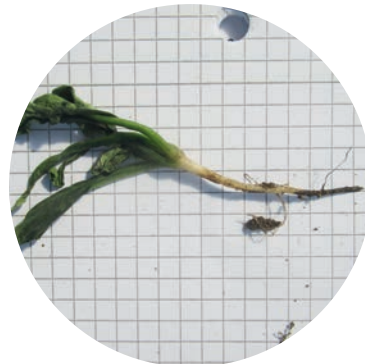
- Low pH, optimum pH 6,5 -7,0
- Apply limestone at low pH

Rhizoctonia

Rhizoctonia solani

Symptoms

- Damping off seedlings (same as Pythium)
- Light brown tap root
- Begins as elliptically shaped, brown to black sunken cankers on roots and hypocotyls with a sharp margin between infected and healthy tissue
- Fungus will stay in the soil for several years
- Wide range of host plants
- Low pH can give easier problems



To Avoid

- Poorly draining soils
- Frequent spinach production on same soil
- Solid soil texture
- Sensitive cultivars

Fungi



Downy mildew

Peronospora farinosa

Symptoms

- Yellow lesions on the upper surface
- greyish spores on the under surface

Favourable conditions

Moist, cool

Host range

Spinach



Anthracnose leaf spot

Colletotrichum dematium

Symptoms

- Bigger spots
- Will easier rot
- Dark spots in the center
- Initially, pale green/brown irregular lesions, then lightbrown and shot-holed

Favourable conditions

Wet, cool

Host range

Chenopod species



White rust

Albugo occidentalis

Symptoms

- Yellow lesions on the upper leaf surface
- White pustules on the underside of the leaf

Favourable conditions

Moist, cool

Host range

Brassica,

spinach



Cladosporium leaf spot

Cladosporium variabile

Symptoms

- Smaller spots
- Will not rot, stays dry
- Looks like pin-prick
- Brown looks
- Pale lesions

Favourable conditions

Moist, cool

Host range

Chenopod species



Stemphylium leaf spot

Stemphylium botryosum

Symptoms

- Tan lesion with green watersoaked margin

Favourable conditions

Moist, warm

Host range

Spinach



Phoma leaf spot

Phoma betae

Symptoms

- Round leaf spots
- Concentric rings on perimeter
- Dark margin

Favourable conditions

Moist, cool to warm

Host range

Beet, spinach



Cercospora leaf spot

Cercospora beticola

Symptoms

- Circular leaf spots
- Red-brown margin
- On older leaves

Favourable conditions

Moist, warm

Host range

Beet, chard, spinach, chenopod weeds



Verticillium

Verticillium dahliae

Symptoms

- Yellowing and wilting of plants in seed production

Favourable conditions

Moist, temperate

Host range

Spinach, lettuce, strawberry



Insects



Beat leaf miner

Pegomya betae

Symptoms

- Dried and discoloured leaves

Favourable conditions

Cool

Host range

Spinach, beet, several weeds



Caterpillars

Symptoms

- Leaves are attacked, resulting in stunted leaves/ plants

Favourable conditions

Warmer temperatures

Host range

Wide variety of host ranges, one of them is spinach



Black bean aphid

Aphis fabae

Symptoms

- Stunted plants and wilted leaves

Favourable conditions

Warmer temperatures

Host range

Wide variety of host ranges, one of them is spinach



Straw mite

Thyroglyphus spp.

Symptoms

- Holes in leaves and deformed leaves

Favourable conditions

High temperatures and humidity, food present

Host range

Gerbera, Kalanchoe, Anthurium, Cyclopa, Begonia, Bromelia



Viruses



CMV

Cucumber Mosaic Virus

Symptoms

- Leaves narrow, curled, wrinkled, margins roll in
- Yellow and green mosaic
- Stunting leaves

Favourable conditions

Moist, temperate

Host range

Wide host range, included many vegetables (especially Cucurbits)

Vector

Aphids



TRV

Tobacco Rattle Virus

Symptoms

- Yellow, necrotic spotting, mottling, leaf crinkling

Favourable conditions

Moist, cool

Host range

Wide host range

Vector

Nematodes



BNYVV

Bean Necrotic Yellow Vein Virus

Symptoms

- Intervenial yellowing
- Thick, leathery, brittle leaves

Favourable conditions

Moist, warm

Host range

Wide host range, many weeds

Vector

Aphids





Rijk Zwaan USA

701 La Guardia Street, Suite A

Salinas, CA 93905

T 831 455 3000

www.rijkszwaanusa.com

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