

Explanation of plates

Plate I. Symptoms on the leaves of sugar beet affected with rhizomania.

1. Wilting of leaves and dead leaves in early August. These plants were raised seedlings in paper pots with infested soil, and they were transplanted into the main field in early May.
2. Deficiency of elements (August).
3. Yellow veins (August).
4. Symptoms on the leaves of sugar beet grown in pots filled with infested soil which pH was adjusted with CaCO_3 ; No. 1 is control (soil pH 5.6) : health, No. 2 was applied with CaCO_3 7.5 g per 1 liter soil (soil pH 7.2) : yellow veins, No.3 was applied with CaCO_3 10 g per 1 liter soil (soil pH 7.8) : yellowing, No. 4 was applied with CaSO_4 8.6 g per 1 liter soil (soil pH 5.0) : health, No. 5 was applied with CaSO_4 12.9 g per 1 liter soil (soil pH 5.0) : health.
5. Yellowing of leaves and elongation of petioles in a slightly infested field (late September).
6. Yellow veins symptom by manual inoculation of sap at young seedlings stage.
7. Necrotic spots (August).

Plate II. Symptoms on the roots of sugar beet affected with rhizomania.

1. The proliferation of rootlets. The plant was grown in a heavily infested field (September).
2. The necrosis of vascular bundles and the decay of the root tip (September).
3. The proliferation of rootlets appears in some of the lateral roots. The healthy seedling was transplanted into an infested field (October).
4. A heavy necrosis of vascular bundles and the decay of the main root (October).
5. A plant on the left hand : health, five plants on the right hand : diseased.

Plate III. Observations in root-boxes.

1. Sugar beet grown in soil inoculated with BNYVV—carrying *Polymyxa betae* (TNS—F—198554 isolate). The leaves are yellowing and stunting.
2. do. (proliferation of rootlets).
3. Sugar beet grown in soil inoculated with BNYVV—free *P.betae* (P—1 isolate). The leaves are normal.
4. do. (roots are normal).

Plate IV. The incidence patterns of rhizomania of sugar beet in six infested fields (October).

1. Broadly and heavily infected patch (Field No. 1 shown in Table 10).
2. do. (belt like : Field No. 2 shown in Table 10).
3. Limitedly but heavily infected patch (Field No. 3 shown in Table 10).
4. Broadly but slightly infected patch (Field No. 4 shown in Table 10).
5. Limitedly and slightly infected patch (Field No. 5 shown in Table 10).
6. Limitedly but heavily infected patch (Field No. 6 shown in Table 10).

Plate V. The morphology of *Polymyxa betae* isolated from sugar beet.

1. Plasmodia of *P.betae* in sugar beet rootlet cells (Bar represents 40 μm).
2. Plasmodia in a cross section of plastic block from sugar beet rootlet infected with *P.betae* (Stained with methylene blue—azure II—basic fuchsin. Bar represents 30 μm).
3. A cross section of polyethylene glycol—block from sugar beet rootlet infected with *P.betae* (Stained with FITC. Bar represents 30 μm).
4. Restig spore clusters of *P.betae* isolated from root tissues.
5. Zoosporangia of *P.betae* in sugar beet rootlet

cells (Bar represents 40 μ m).

6. Zoospores released from zoosporangia of *P. betae* in sugar beet rootlet cells (Bar represents 20 μ m).
7. Resting spore clusters of *P. betae* in sugar beet rootlet cells (Bar represents 40 μ m).
8. do. (Bar represents 10 μ m).

Plate VI. The morphology of *Polymyxa betae* isolated from several plant species.

1. Zoosporangia of *P. betae* in *Chenopodium ficifolium* rootlet cells (Bar represents 30 μ m).
2. Zoosporangia of *P. betae* in *C. album* rootlet cells (Bar represents 30 μ m).
3. Zoosporangia of *P. betae* in *Amaranthus retroflexus* rootlet cells (Bar represents 30 μ m).
4. Plasmodia of *P. betae* in *Portulaca oleracea* rootlet cells (Bar represents 40 μ m).
5. Zoosporangia of *P. betae* in *P. oleracea* rootlet cells (Bar represents 30 μ m).
6. Resting spore clusters of *P. betae* in *C. ficifolium* rootlet cells (Bar represents 20 μ m).
7. Resting spore clusters of *P. betae* in *C. album* rootlet cells (Bar represents 20 μ m).
8. Resting spore cluster of *P. betae* in *C. quinoa* rootlet cells (Bar represents 20 μ m).
9. Resting spore clusters of *P. betae* in *A. retroflexus* rootlet cells (Bar represents 20 μ m).
10. Resting spore clusters of *P. betae* in *P. oleracea* rootlet cells (Bar represents 20 μ m).

Plate VII. Resting spore clusters of *P. betae* buried in rhizosphere of sugar beet.

1. Resting spore clusters in a cross section of plastic block from sugar beet rootlet infected with *P. betae*.
2. Resting spore clusters in various stages of the germination (Bar represents 5 μ m).
3. A resting spore activated before the germination (Bar represents 2 μ m).
4. Resting spores in different stages of the activity for the germination (Bar represents 3 μ m).

Plate VIII. Ultrathin sections of resting spore clusters of *Polymyxa betae* in several plant species.

1. Sugar beet isolate (Bar represents 2 μ m).
2. *Chenopodium ficifolium* isolate (Bar represents 3 μ m).
3. *C. album* isolate (Bar represents 3 μ m).
4. *Portulaca oleracea* isolate (Bar represents 2 μ m).

Plate IX. BNYVV particles and ultrathin sections of sugar beet rootlets inoculated with BNYVV-carrying *Polymyxa betae*.

1. Negative-stain electron micrograph of concentrated BNYVV virus suspension (Bar represents 400 nm).
2. Virus particles in a zoosporangium of *P. betae* (Bar represents 600 nm).
3. BNYVV particles in an ultrathin section of a root cell of sugar beet (Bar represents 300 nm).
4. BNYVV particles in the vacuoles of immature zoospores within a zoosporangium of *P. betae* (Bar represents 500 nm).
5. BNYVV particles in the cytoplasm of an immature zoospore of *P. betae* (Bar represents 600 nm).

Plate X. BNYVV particles in the cytoplasm of sugar beet cells in contact with plasmodia of *P. betae* (Bar represents 2 μ m).

Plate XI. BNYVV particles in the vacuoles of immature zoospores within zoosporangium of *P. betae* (Bar represents 300 nm).

Abbreviations

BW : sugar beet cell wall, BC : sugar beet cytoplasm, BV : sugar beet vacuole, P : plasmodium, Pv : plasmodium vacuole, Pm : plasmodium membrane, Zg : zoosporangium, ew : enveloping wall, Z : zoospore, f : flagellum, R : resting spore, L : lipid body, Rg : resting spore just before the germination, Re : empty resting spore, V : virus particles, N : nucleus of *P. betae*, M : mitochondrion.

Plate. I



Plate. II

