

CONTENTS

Prologue.....	vii
Familiar environment no longer: Pine forests	
I. Exploring the true cause of massive pine death	1
1. So-called “Pine-eating beetles” – Relationship between wood-boring beetles and trees	1
2. New developments in clarifying the cause of PWD.....	11
3. How the pine wilt spread and became an epidemic.....	21
II. Biological relationship in pine wilt disease	32
1. Biology of the pinewood nematode.....	32
2. Airliner and passengers	44
3. What determines the pathogenicity of two pinewood nematodes - A comparison with the less-pathogenic pinewood nematode.....	63
4. Host resistance and nematode behavior	77
III. The mechanism by which tiny nematodes kill huge pine trees.....	106
1. Dynamic host resistance	106
2. Host cellular responses.....	112
3. Host cell suicide reaction	116
IV. The influence of environmental factors on the spread of pine wilt disease	125
1. Pine wilt disease and the disappearance of mycorrhizal fungi	125
2. Effects of air pollution on pine wilt disease	135
3. Great hindrance to the control of pine wilt disease: asymptomatic carrier trees.....	146
V. Global concerns regarding pine wilt.....	158
1. The situation in North America.....	158
2. Nomenclature of the pinewood nematode.....	159
3. Pine wilt problem in Europe.....	160
4. Pine Wilt Disease in east Asian countries	164
5. Ban on conifer trading and the molecular phylogeny of pinewood nematodes.....	166
6. Development of subsequent research	171

Epilogue.....	173
Bibliography.....	176