

# Study on Evaluation of Coppice Landscape Depend on Healthiness of Plants

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## Abstract

It is increasing scenery created as a result of pine wilt disease. The purpose of this study is to investigate the local resident's awareness against the scenery caused by pine wilt disease in their neighboring area, through the questionnaire investigation. The result showed that more than 40 % of the residents are not aware of such scenery in their local area, and about 30% of the residents did not know that those trees were dying. More than 40% of the people do not know of the pine wilt disease as a general argument. Another question showed that the recognition of such scenery depends on the distance of the viewer. General residents don't worry about such scenery in the far distance in fact some of them think those are colored leaves. However, the nearer they see the trees, the higher they have negative feeling against it.

*Key Words : Pine Wilt Disease, Recognition Of Residents, Landscape Scenery*

## 1. INTRODUCTION

In discussing the local environment, it is important to fully understand the relation between the natural environment and local residents. The environment is the combination of the nature unique to the area, including local vegetation, and consequences of human activities. Moreover, attention has been increasingly paid on Satoyama, local forests, as one of the local natural environments, and the need for developing the measures to preserve it has been called for. In Japan, it generally consists mostly of deciduous broad-leaved trees, such as *Quercus serrata* Thunb. In the region covering from the Chugoku mountains in the Kansai District to the Seto Inland district, *Pinus densiflora* pines, as secondary vegetation constitutes a forest, which creates a unique landscape. It is expected that

evaluations of the local environment by the residents largely depend on vegetation and plant health conditions. Recently, *Pinus densiflora* pines have been dying of pine wilt diseases. That is leading to drastic changes in the whole vegetation and to environmental change in the local area. Under these circumstances, understanding of effects of pine wilt disease on the local environment is very important in preserving the existing well-balanced local environment and creating a better local landscape in the future.

Pine wilt disease has been studied in various fields, such as plant physiology, ecology, and environmental design, to elucidate the mechanism for causing pine wilt disease, as well as to develop ways to control it and restore the affected pine trees. Fujihara et. al<sup>1)</sup> have published a report on the damage by pine wilt disease and its causes, and Iwasaki et. al<sup>2)</sup> have

reported on the local environment restored after damage by pine wilt disease, while Hattori and coworkers<sup>4)</sup> and Yamase<sup>5)</sup> have described healthy management of local forests including pine trees surviving as part of vegetation. However, psychological study on the landscape damaged by pine wilt disease has not been carried out by using local residents. This study analyzes residential feelings about the natural landscape damaged by pine wilt disease, and provides the basis for controlling pine wilt disease in the future from the environmental viewpoint.

## II. METHODS

### 1. Investigation Site

In this study, the Nozima Tokiwa area, one of the areas where pine wilt disease spreads, was used as the

investigation site, and then consciousness analysis was carried out on people residing around this area. In this area, pine wilt disease spread among pine trees to a large degree in 2002.

### 2. Subjects

The Subjects were people residing in the Nozima Tokiwa area, and were divided into two groups. One group consisted of local residents whose ancestors settled into this area in the Meiji era. These residents have been mainly engaged in the primary industry such as rice growing and stockbreeding, and most of them were older farmers involved in another business on the side. This group was defined as the local population. The other group consisted of students who went to the Landscape School and lived in a dormitory. Both of the facilities were located in this area. The students lived there for a period from half a year to one and half years.



Photo1 Far landscape scenery

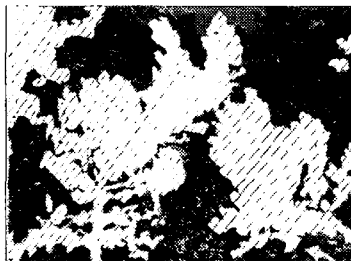


Photo2 Intermediate landscape scenery



Photo3 Close landscape scenery

Fig. 1 Pictures for consciousness analysis and qualitative evaluation (▨ Diseased pine trees)



Photo 1 autumn



Photo 2 summer



Photo 3 winter

Fig. 2 Pictures for image evaluation (▨ Diseased pine trees)

### 3. Consciousness Analysis

A door-to-door interview was conducted using a questionnaire for understanding awareness of pine wilt disease and qualitative analysis residential consciousness of the landscape damaged by pine wilt disease. During the interview, the subjects were also asked to express their views about the landscape scenery including pine trees suffering from pine wilt disease. When we visited their home for interview and found that they were not there, we left the questionnaire. The questionnaire was completed, and later collected. As not all subjects were fully aware of landscape damaged by pine wilt disease, they were given pictures taken at the investigation site in order to help them recall the damaged landscape scenery.

Before the questionnaire was prepared, we offered open questions to two residents by showing some pictures of landscape scenery damaged by pine wilt disease. Each item listed in the questionnaire was based on the responses by these 2 residents. Then, the following questionnaire was prepared for the interview. The questionnaire consisted of two groups: Group A and Group B.

- 1) Awareness evaluation of pine wilt disease and qualitative analysis for consciousness about the damaged landscape

The pictures used in the interview are in Fig. 1. Group A consisted of two parts: Part A, where general views on landscape scenery damaged by pine wilt disease were asked, and Part B, where views on landscape scenery damaged by pine wilt disease in their local forest were asked.

Firstly, subjects were required to answer the items of Part A while looking at the pictures. The items of Part A and B were shown at table1 and table2. The subjects of Part A (from (1) to (6)) were required to answer "Yes" or "No" to each item. The items from

(7) to (9) were open questions.

- 2) Image analysis for landscape scenery damaged by pine wilt disease

In Group B, subjects were required to answer their impression when they looked at different landscape scenery including dying pine trees was evaluated. The landscape scenery they looked at are different, depending the site where subjects stand. And the impression they have is also different from site to site. Therefore, we set three different distances and took the pictures including dying pinewoods at each distance to evaluate changes in the residential impression. Firstly, we took pictures at a long distance so that the pictures covered the whole withering pinewoods, and we defined them as far view. Next, we took pictures at a moderate distance so that subjects can examine each dying pine tree, and we defined them at intermediate view. Then, we took pictures at a short distance so that they can observe leaves of each dying pine tree, and defined them as close view. Subjects were required to answer their impressions when they looked at these three kinds of pictures. Their impression was asked through interview. The interviews were carried out during the period between October 2002 and December 2002, when trees's leaves turned red and in this area.

- 3) Evaluation for landscape scenery including withering pine trees at different seasons

Residential impression toward landscape scenery, including withering pine trees, in three different seasons was examined by using pictures of far view. The subjects were students attending the landscape college located in the study area. The pictures used are in Fig. 2. Photo.1 was taken in autumn, in the picture, most of the trees' leaves had turned red. Photo. 2 was taken in summer, and only dying pine trees turned red. Photo. 3 was taken in winter, and

pine wilt disease spread over almost all the pine trees, which had no leaves at all and had only bare branches. These pictures were shown to subjects at one time, and the subjects were asked to report the number of the picture which caused them to feel the pinewoods were most damaged, and the number of the one which led them to feel the pinewoods were least damaged. This landscape evaluation was carried out in October 2003.

#### 4. Data Analysis

It was found that consciousness of the local population about landscape including dying pine trees and the results of qualitative analysis were different from those of the students. Therefore, the data

obtained were separately analyzed. The total number of the local population was 17. Out of them, 8 were under 60 years old, and 9 were 60 years old or older. The students totaled 48 with 47 under 60 years old, and 1 aged 60 years or older.

### III. RESULTS

#### 1. Consciousness Analysis

The results of Part A in Group A are shown in Table 1. It was found, from the results of Item (1), that more than 40% of the local population were not aware of their worsening landscape, while almost all of the students were aware of it. Item (2) to (6) showed same pattern.

Table 1. The results of consciousness

Item (Part A)	Subject	Yes	No	Total
(1) Were you aware that the situation "Satoyama" faced has been worsening?	Local residents	10(58.8%)	7(41.2%)	17(100%)
	Students	47(97.9%)	1(2.1%)	48(100%)
(2) Pine trees were dying nationwide. Were you aware of this?"	Local residents	12(70.6%)	5(29.4%)	17(100%)
	Students	48(100%)	0(0.0%)	48(100%)
(3) Did you know that there have been problems resulting from pine trees dying throughout the nation?	Local residents	10(58.8%)	7(41.2%)	17(100%)
	Students	44(91.7%)	4(8.3%)	48(100%)
(4) Were you aware that pine trees have begun to die in the Nozima Tokiwa area this year?	Local residents	12(70.6%)	5(29.4%)	17(100%)
	Students	43(89.6%)	5(10.4%)	48(100%)
(5) Did you know why pine trees were dying?	Local residents	13(76.5%)	4(23.5%)	17(100%)
	Students	43(89.6%)	5(10.4%)	48(100%)
(6) Have you talked about dying pine trees with other local residents?	Local residents	6(35.3%)	11(64.7%)	17(100%)
	Students	43(91.5%)	4(8.5%)	47(100%)

Table 2. The results of qualitative

Subject	Local residents	Student
(7) For those who answered "YES" in item (6), what kind of topics did you talk with other residents?	Cause of dying pine trees (2) Worried (1)	Search for the cause of dying pine trees and the need for its countermeasures (26) Worried (1) The fact that pine trees were dying (10) Effects on landscape (4)
(8) What is your view about pine trees dying throughout the nation?	No interest (1) Having interest (1) Bad, wasting the natural environment, pitiful (10) The need for countermeasures (4) Causes (1)	Bad, wasting the natural environment, pitiful (31) Bad effects on landscape (31) The need for countermeasures (9) Lost of pin trees (4) Cause of dying pine trees (6)
(9) What is your view on pine trees withering in your local area?	Helpless (3) Pitiful, wasting the natural environment (10) The need for countermeasures (4)	Don't know (1) Pitiful, Concern (34) The need for countermeasures (15) Don't care (3)

These results demonstrated that the local residents were largely different from the students in consciousness about landscape including dying pine trees.

## 2. Qualitative Analysis

Table 2 showed the results of qualitative analysis for landscape scenery of dying pine trees.

As for Item (7) in Group A, valid responses were obtained from 5 subjects in the local population. Out of the 5 subjects, 2 subjects talked about the cause of dying pine trees, one expressed his concern over them, and one told that pine trees wither periodically. On the other hand, valid responses were obtained from 41 of the students. Twenty-six subjects (60%) talked about the cause of or measures against dying pine trees, which was the highest number. These results indicated that most of the local subjects seldom talked about dying pine trees, while the students talked about the search for the cause of dying pine trees and the need for their countermeasures, which suggested that the students had much greater interest in withering pine trees than the local population.

As to Item (8), valid responses were obtained from 16 local subjects, and some of them had more than one response. The responses were classified into 5 groups. Among them, the negative views, such as "not good", and "bad effects on the well-balanced

landscape", accounted for 59%. Valid views were obtained from 47 students, and some students had multiple responses. Among them, the negative responses, described above, accounted for 62%.

As for Item (9), 16 local subjects offered valid responses, and some of them had multiple responses. The responses were classified into 3 groups. Out of them, 59% of them had negative views. Their responses were almost same about Item(7) and (8).

These results suggested that both subject groups tend to have negative views toward dying pine trees.

## 3. Image Analysis for Dying Pinewoods

Table 3 shows the results of Group B.

Firstly, as for far landscape scenery, most of the local residents and students who responded said that the dying pine trees looked as if they were aflame with red leaves, indicating that dying pine trees look beautiful at a long distance.

Next, as for close landscape scenery, most of the both local subjects and students responded that the landscape scenery was unattractive and terrible, and that they found that pine trees were withering.

These results indicated that impressions of landscape scenery including dying pine trees were differed according to the distance between them and the subjects. When the subjects looked at far landscape

Table 3. Evaluation according to three landscape

landscape scenery	Local residents	Students
Far	Beautiful, looking as they turned red in autumn (11) Damaging (2)	Withering (8) Terrible (7) Looking as they turned red in autumn (25) No problem (7) Need for countermeasures (1)
Intermediate	Beautiful (5) Withering (6) Pitiful (2) Countermeasures (1)	Withering (25) Pitiful (3) Terrible (14) Worried (3) Need for countermeasures (2) No problem (1)
Close	Beautiful (1) Want to help (2) Unattractive, terrible (5) Withering (4)	Beautiful (1) Want to help (2) Unattractive, terrible (25) Sorry (6) Withering (6) Need for countermeasures (3) Wonder (3) Don't know the degree of dying pine trees (2)

scenery, the dying pine trees did not worsen their impression. However, as they came closer to pine trees, they considered the landscape scenery as worse.

#### 4. Evaluation of Landscape Scenery at Different Seasons

Next photos show the results of impressions obtained with pictures taken at different seasons. The pictures are in Fig. 2.

Twenty-five out of 40 subjects (more than 60%), when they looked at Photo 1, felt that the pine trees were dying most heavily. In this photo, they felt that the pine trees seemed redder than they actually were, which was an optical illusion because the other trees turned red in autumn(photo 2 (7subjects), photo 3(8subjects)).

On the other hand, that 14 out of 40 (more than 30%), when they looked at Photo 3, felt that the pine trees did not seem to be dying. This suggests that the subjects rarely felt that the pine trees are dying in spite of the presence of many dying pine trees. One of the reasons for this was that pine wilt disease has progressed severely, and the pine trees have no turned-red leaves, which was one of its common symptoms (photo1 (4 subjects), photo2 (6 subjects)).

These results suggested that, when people looked at far landscape as woodland landscape, red leaves largely affected their impression that landscape scenery included dying pine trees.

## IV. CONSIDERATIONS

These results suggest that the local people, at first sight, do not tend to consider dying pine trees as one of the environmentally serious problems. It was found, on the other hand, that students majoring in

landscape were more sensitive to dying pine trees. Their results were similar to those of experts for pine wilt disease. As the reason why the local residents did not consider dying pine trees as a problem as seriously as the students did, the local residents did not, at first sight when they saw them at a long distance, distinguish dying pine trees from trees turning red in autumn. As the local residents closed to the dying pine trees, they became aware that they were withering. At close landscape scenery, especially, many of them had negative views.

This study found that consciousness about landscape including dying pine trees was different according to occupation. The consciousness depended on the technical knowledge and information on pine wilt disease people have.

The analytical results obtained using pictures of three types of landscape scenery indicated that, when the subjects looked at the picture of far landscape scenery, including bare pine trees, they were less conscious about dying pine trees, and landscape scenery including dying pine trees was largely affected by the other trees whose leaves turned red in autumn.

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