dense planting section. "T-bars" were 1.5 m high. The shelf was made of five wires stretched on the "T-bar" at intervals of 30 cm. The main branch of a kiwi fruit tree was subjected to straight-line training, for causing it to extend along the middle wire, and the current shoot was led so that it cut the wire at right angles. Regarding peaches and plums, open center type natural forming with three main branches was employed.

5) Tests and Examinations

The growth, flowering and fruit bearing of the trees were examined in the field, and yields and quality of harvested fruits were examined.

New tests were planned and conducted regarding those items which were considered necessary in continuing culture of these fruits.

(3) Examination Results

1) Kiwi Fruit

a. Growth of Trees

The kiwi fruit seedlings planted in the experiment field grew comparatively steadily in early stages from sprouting in spring to early summer every year. They were, however, often injured by poyraz (dry, northerly wind) in the dry season from July to the fall, with their leaves being broken and leaf margins dying back. Every year during the experiment period, a northerly wind of a velocity of around 10 m continued to blow for two or three days once or twice, injuring leaves, taking water from them, and thereby causing them to die back.

As this wind injury was foreseen, a windbreak was planned for the experiment field. Juniper and cypress trees, which were the most common trees for shelter belts, were planted around the field. These trees, however, did not grow enough to protect the field from winds in a short period of time, as a matter of course, and their windbreak effect was expected in the future. In order to mitigate wind injuries, a windbreak net 6 m high was constructed from the summer to the fall of 1993, along the north, west and south ends of the field. As Canadian poplars, which grew fast, proved to be effective as windbreak trees, these were planted in the spring of 1995, along the windbreak net, in addition to juniper and cypress trees, at intervals of 1.5 m.

Meantime, leaf chlorosis broke out from place to place, seemingly due to the soil environment. Not only the growth of those trees where the outbreak of chlorosis was considerable was impeded but also sometimes withering resulted. For coping with the situation, ingredients of the soil and leaves were examined, with a view to identifying insufficient ingredients, and the leaf spraying of micro elements was carried out on a trial basis, for normalizing the balance of ingredients. This produced a certain result. A test was carried out on the soil's inclination to alkaline reaction (mentioned later). The field had a comparatively large amount of rainfall for six months from December through May, and the ground water level was apt to become high, as the soil was viscous and

less permeable. For the purpose of facilitating draining of the field, a drain (2 m deep) was constructed in the summer of 1993 along the east end of the field. It was expected that the rise of the ground water level would be consequently controlled from the winter of 1994, but the soil seemed too viscous to produce satisfactory results.

Among the seedlings planted under these conditions, 199 died by the fall of 1990, the first year of planting. A request was made that seedlings be sent from Japan for filling the vacant places. The transport of the seedlings, however, unfortunately coincided with the outbreak of the Gulf War in 1991, and their arrival was delayed considerably, being directly affected by the war. This worsened the conditions of the seedlings, with some being dead and some showing unsatisfactory growth. In 1992, seedlings were sent from Japan to replace the dead ones. Seedlings, however, died every year after that, though in a small number. Observations made it clear that seedlings died from leaf chlorosis and suffocation in roots due to the rise of the ground water level in winter. Especially the torrential downpour of 238.5 mm lasting for four days from November 18 through 21, 1994 caused the ground water level to remain raised for more than three months, together with rains after that, suffocating the roots of kiwi fruit trees. As a result, the number of trees which died in the spring and the summer of 1995 was considerable, and damage was great.

Fig. 2-5-4 shows the degree of the outbreak of chlorosis in the kiwi fruit field in July 1995, six years after the test was commenced. Values were given to degrees of chlorosis, for the purpose of understanding the conditions of kiwi fruit trees at that time.

Values were given as follows.

0 ... Healthy trees without chlorosis (no mark is given in Fig. 2-5-4.)
1 ... Slight appearance of yellow leaves (about 30% of the entire leaves)
2 ... Half the leaves being yellow
3 ... Considerable appearance of yellow leaves (about 80% of the entire leaves)
4 ... The entire leaves being yellow
5 ... Yellow leaves mixed with white leaves caused by chlorosis
6 ... Most of the leaves being white
7 ... White leaves mixed with dead leaves

These were numerically expressed as follows.

Table 2-5-1 Conditions in the kiwi fruit field in July 1995

Variety	Number of seedlings first planted	Number of seedlings died by May 1995	Number of seedlings died by July 1995	Number of seedlings left as stocks	Number as of July 1995
Hayward	898	177 (19.7%)	546 (69.8%)	13	339(37.8%)
Tomuri	85	46 (54.1%)	69 (81.2%)	-	16(18.8%)

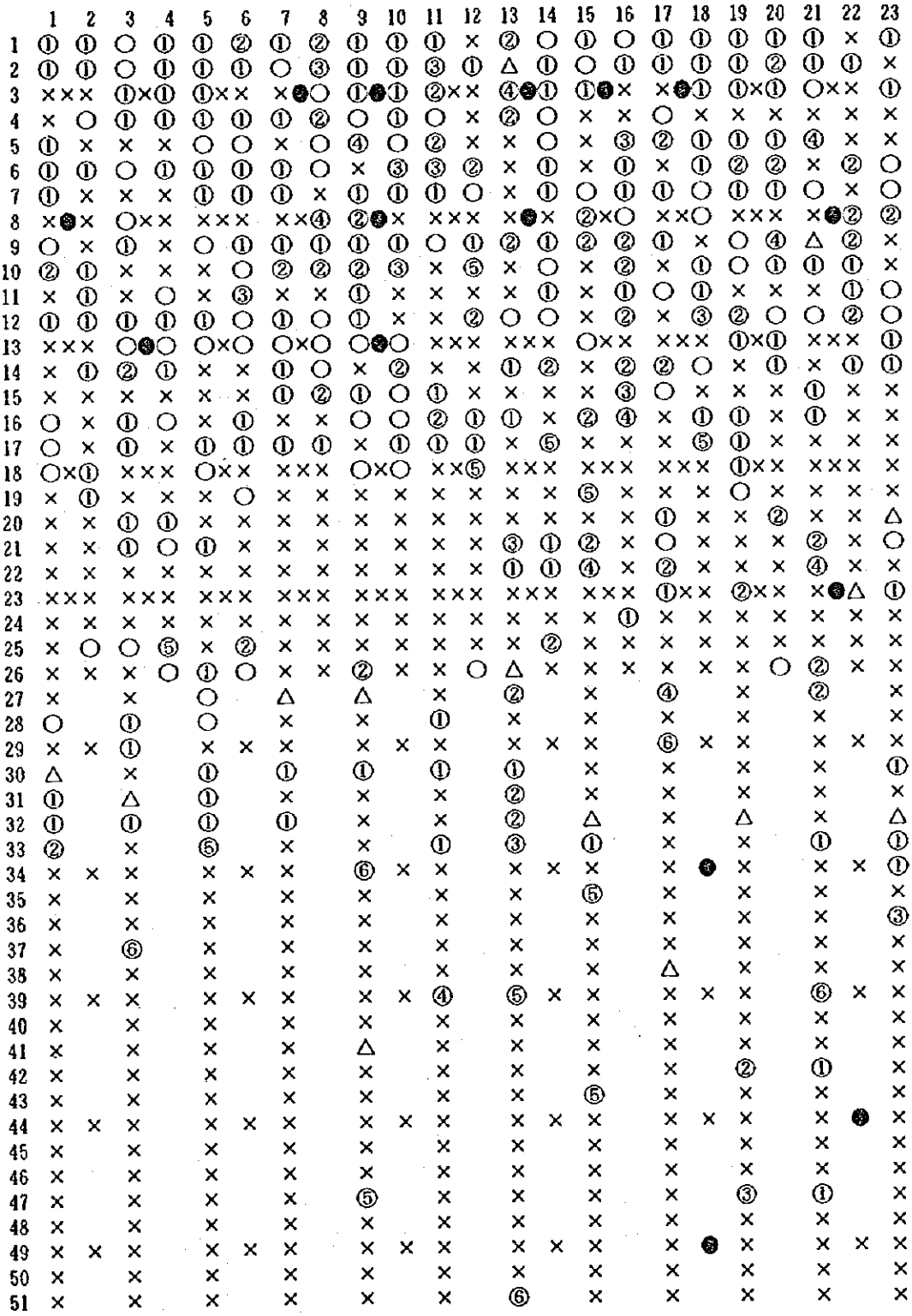

Fig.2-5-4 Existing state of kiwi fruit field (July, 1995)

Note: ○: Hayward ×: Died tree
●: Tomuri △: Only stock
Numbers in ○ are values about degree of chlorosis.

Table 2-5-2 Outbreak of chlorosis in Hayward trees in July 1995

Degree of chlorosis	0	1	2	3	4	5	6	7	Total
Number of trees	82	161	53	12	8	11	5	0	339
% of outbreak	24	48	16	4	2	3	2	0	100

As shown in the tables, trees were planted in the second and the third years to fill the vacancies among the trees planted in the first year. Some trees died after that, with about 20% of them being dead by the spring of 1994, the fifth year, and about 50% being dead by 1995, the sixth year, due to damage from excessive soil humidity. Many of the deaths of trees occurred in the south side occupying two thirds of the field. In most of the trees survived in this portion, intense chlorosis was found, and further deaths were anticipated. It seemed that it would be difficult to continue tests there for kiwi fruit growing. In the north side occupying one third of the field, the number of trees died was comparatively small, and chlorosis was relatively slight in the remaining trees. It was possible, therefore, to continue tests in this portion.

Table 2-5-3 shows the growth of kiwi fruit trees under these conditions.

The time of sprouting and leafing differed from year to year, but these generally occurred earlier than in Japan, with bud opening being almost simultaneous, on the whole. There was no insufficient dormancy awaking due to insufficient low temperatures during winter. In other words, it is thought that cumulative low temperature necessary for breaking dormancy of kiwi fruit buds never becomes insufficient, in temperatures during winter in the Adana district.

Especially it was warmer from the fall to the early winter of 1993, with temperatures being higher than the average, but there was no problem in sprouting in 1994.

The year 1994 had an unusual quantity of precipitation, while temperatures were lower than the previous year and rose steadily in early spring, resulting in earlier sprouting and flowering.

Table 2-5-3 Growth stage of kiwi fruit from 1993 to 1995

Variety	Year	Date of sprouting	Date of leafing	Date of flowering	Date of full bloom	End of flowering	Date of harvest
Hayward	1993	3.17	3.20	5.10	5.16		11.16
	1994	3.20	4. 3	5.12	5.15	5.18	11. 5
	1995	3. 6	3.22	5. 5	5. 8	5.15	11.17
Tomuri	1993	3.17	4. 3	5. 5	5.11		-
	1994	3.18	4. 1	5.10	5.13	5.16	-
	1995	3. 4	3.18	5. 2	5. 5	5.10	-

For the purpose of providing an indicator which showed the degree of growth of the trees before sprouting in 1996, seven years after the test was commenced, girths were measured at 20 cm above the ground, with 30 trees (including chlorosis trees) selected at random from among the existing trees, current shoots were counted, and the spread of branches

along the wires of the net (the spread of fruit bearing branches after pruning) was measured. The results are shown in Table 2-5-4.

Table 2-5-4 Degree of growth of kiwi fruit trees in February 1996

Item	Largest	Smallest	Average	Standard dev.
Girth (cm)	15.0	10.0	12.7	2.56
No. of current shoots per tree	32	16	22.4	6.40
Spread of tree (cm)	365	204	275	77

Difference in size was considerable and growth was uneven for the first three years. Those trees whose growth was delayed died one after another, while the other trees became even in size. Still, growth was slight on the whole. The average girth of 12.7 cm, the average number of current shoots of 22.4, and the average spread of 275 cm were very small amounts of growth for six-year-old trees. In Japan, trees become this large or bigger generally three years after being planted. It must be said that the growth of kiwi fruit trees was very unsatisfactory in the experiment field.

Causes of restraining growth were supposed to include the following. Reaction of the soil was inclined to alkalinity, preventing the absorption of specific fertilizer elements, causing chlorosis, which was a disease due to deficiency of these elements, and thereby lowering photosynthetic power of leaves. Water remaining in the soil, which was viscous and flat, due to much rain during winter, lowered vitality of roots or caused them to die. Poyraz (dry, northerly winds) in early summer broke current shoots near their roots or at their tips or injured leaves, thereby restraining the growth of trees. If it happened that dry days with high temperatures exceeding 40℃ continued, as in the high temperatures lasting for three days from May 21, 1995, leaves got burnt and lost vitality. Any of these is a problem difficult to solve.

b. Fruit Production

In 1992, three years after planting, trees began to bear fruit, and 53 trees (7.4%) bore fruit in 1993, producing a harvest of 36.5 kg.

Fruit bearing begins in the third year, when Hayward seedlings are cultivated in Japan. This result in the experiment field was therefore considered ordinary. In the following year, however, the situation was completely changed, and few trees flowered, with only four trees bearing fruit (14 Tomuri trees flowered) and only 10 kiwi fruit were harvested. In those trees where chlorosis appeared on leaves, this seemed a consequence of an insufficient accumulation of carbohydrates, which impeded flower differentiation, while causes of non-occurrence of flower differentiation could not be cleared up regarding those trees in which chlorosis was not found. In 1995, flowering was also poor. While the Tomuri trees flowered, only 12 Hayward trees flowered. Only 6.1 kg of Hayward kiwi fruit was harvested.

Table 2-5-5 shows characteristics of the kiwi fruit immediately after

harvest.

Table 2-5-5 Quality and yield of Hayward kiwi fruit

Year	Date of harvest	Wt./ fruit	Sugar content	Long. dia.	Trans. dia.	Trans. dia.	No. of fruit bearing trees	Yield
			Brix	cm	cm	cm		kg
1993	Nov. 16	63.1	10.0	4.8	4.4	5.5	53	36.5
1994	Nov. 4	65.6	7.1	4.6	4.5	5.4	4	0.6
1995	Oct. 17	85.9	6.5	6.3	4.6	5.2	12	6.1

Weight per fruit was 63.1 g and 65.6 g in 1993 and 1994, respectively, too small to be compared with Japanese products. In 1993, when harvesting was carried out after frosting, with a view to fattening kiwi fruit as mush as possible, sugar content already exceeded 10 Brix, proving it to be late harvesting. The 1994 harvest showed a sugar content of 7.1 Brix, proving to be timely harvesting. In 1995, weight per fruit was 85.9 g, showing a little fattening of fruit, but they were not yet sufficient in size.

Unlike other fruits, kiwi fruit are not good to eat immediately after harvest and need after-ripening for a certain period until they become tasty. Tests were conducted on after-ripening.

Table 2-5-6 shows changes of hardness and sugar contents of the kiwi fruit stored in a wooden box and placed in a room immediately after harvest on November 16, 1993.

Table 2-5-6 After-ripening of kiwi fruit (1993)

Date	Hardness (kg)	Sugar content (Brix)
Nov. 16	4.2	9.8
Dec. 3	3.2	13.9
Dec. 10	2.3	14.5
Dec. 17	1.6	16.5
Dec. 24	1.4	15.7
Dec. 31	0.8	16.5

Note 1: Hardness was measured with a fruit hardness meter of Japanese make. An iron bar 8 mm in diameter was placed on the side of fruit in right angles and pressed until the fruit was pierced with it. The force required for piercing was measured and expressed in kg (see the table above). Hardness not exceeding 2.0 kg shows the fruit is good to eat.

2: The mean temperature in the room between November 20 and December 31, 1993 was 11.6℃.

The hardness of the fruit in storage declined up to 1.6 on December 17, just one month after harvest, with a sugar content of 16.5 Brix, showing good edible quality. After December 24, hardness was reduced further, but sugar content was not increased. It was concluded that after-ripening was completed in one month in the room with the mean temperature of 11.6 ℃. As hardness became less than 1.0, the fruit became so soft that tastiness could not be expected, and eating quality diminished. It was concluded that the fruit was just right for eating

during ten days between December 15 and 24. In 1995, kiwi fruit was harvested earlier. High temperatures promoted after-ripening in room temperature, and on November 1, 15 days after harvest, hardness reached 1.2, which was the peak of good eating quality (Table 2-5-7). It was concluded that the fruit was just right for eating during six days between October 28 and November 2. The fruit, showing a sugar content of 15.8 Brix after after-ripening,were of good quality. As the period required for after-ripening depended on temperature, temperature regulation was necessary if kiwi fruit needed to be eaten in a certain period of time.

A cold storage chamber was prepared, with a view to conducting tests on storage temperatures and after-ripening periods. Tests were, however, not conducted because of insufficient fruit samples due to poor fruit bearing.

Table 2-5-7 After-ripening of kiwi fruit (1995)

Date	Hardness (kg)	Sugar content (Brix)
Oct. 17	4.4	9.8
Oct. 22	3.2	12.2
Oct. 27	2.3	14.1
Nov. 1	1.2	15.8
Nov. 6	0.8	15.6

Note: The mean temperature in the room between October 17 and 31, 1995 was 19.1 ℃.

Although kiwi fruit harvested in 1993 and 1995 were considerably small for the Hayward variety, they were of good quality, showing a sugar content of 16.5 Brix and 15.6 Brix, respectively, immediately after after-ripening, and their flesh was moderately green.

2) Peaches

a. Growth of Seedlings

There was no significant difference in growth between the Dixi Red variety and the Early Red variety. Difference in growth was considerable among individual seedlings, depending on locations where they were planted. Moreover, leaf chlorosis continued to appear until 1994 in trees planted in certain rows.

The seedlings were planted in 51 rows east and west. Among them, those in the first to the thirteenth rows and in the thirty-fourth to the fifty-first rows (i.e., 34 rows in total, or 67%) grew steadily, while those in 20 rows from the fourteenth row to the thirty-third row (33%) showed poor growth, with chlorosis appearing in many seedlings.

Especially most of those in 13 rows from the eighteenth row to the thirty-first row (25.5%) had few healthy leaves. According to the soil classification map (Fig.2-5-5), the soil of the peach field was classified as "remains soil", and a large number of broken pieces of earthenware were discovered in the soil, which testified to the existence of the

vestiges of ancient civilization. This soil seemed unsuitable for peach cultivation.

The situation was, however, changed completely in the spring of 1995. Non-sprouting and growth stoppage often appeared in trees in those locations where no unusual conditions were found in trees until the preceding year. Causes were supposed to be, as in the case of kiwi fruit, suffocation of roots due to ground water being maintained at high level after the torrential downpour for four days from November 18 through 21 of the previous year, recording a precipitation of as much as 238.5 mm. The drain constructed along the peach field did not seem to be so effective as expected, because of the soil being highly viscous, allowing ground water to stay in the root zone. Among those trees which had shown steady growth by developing current shoots by nearly 1 m in the previous year, trees in which non-sprouting suddenly occurred were dug up in April for examination. The fine roots of these trees were found dead. It was concluded that these fine roots, which needed to be active, died from suffocation.

In the fall of 1995, the construction of culverts was planned, for the purpose of preventing ground water from staying at high level. Drains were laid one meter deep, along every other row south of the twenty-ninth row.

Fig.2-5-6 shows the distribution of chlorosis in the experimental peach field in the fall of 1993. Value was given to each degree of the disease, as in the case of kiwi fruit. Fig.2-5-7 shows conditions after sprouting in 1995. The values of the degrees of chlorosis are shown in Table 2-5-8.

Table 2-5-8 Outbreak of chlorosis in the peach field and withered trees (October 1993 and May 1995)

Date of test	Item	Degree of chlorosis									
		0	1	2	3	4	5	6	7	8	Total
Oct. 1993	No. of trees	374	39	22	58	32	37	27	47	31	667
	Ratio of trees %	55	6	3	9	5	6	4	7	5	100
May 1995	No. of trees	119	124	109	81	31	46	39	19	99	667
	Ratio of trees %	18	19	16	12	5	7	6	3	14	100

Note : The following values were given according to the degrees of chlorosis.
0 ... Healthy trees without chlorosis
1 ... Trees having a few yellow leaves (about 30% of the leaves)
2 ... Trees with half the leaves being yellow
3 ... Trees with a considerable number of yellow leaves (about 80% of the leaves)
4 ... Trees whose leaves were yellow
5 ... Trees with yellow leaves mixed with white ones caused by intense chlorosis
6 ... Trees whose leaves were mostly white
7 ... Trees with white leaves mixed with dead ones
8 ... Trees whose leaves were dead

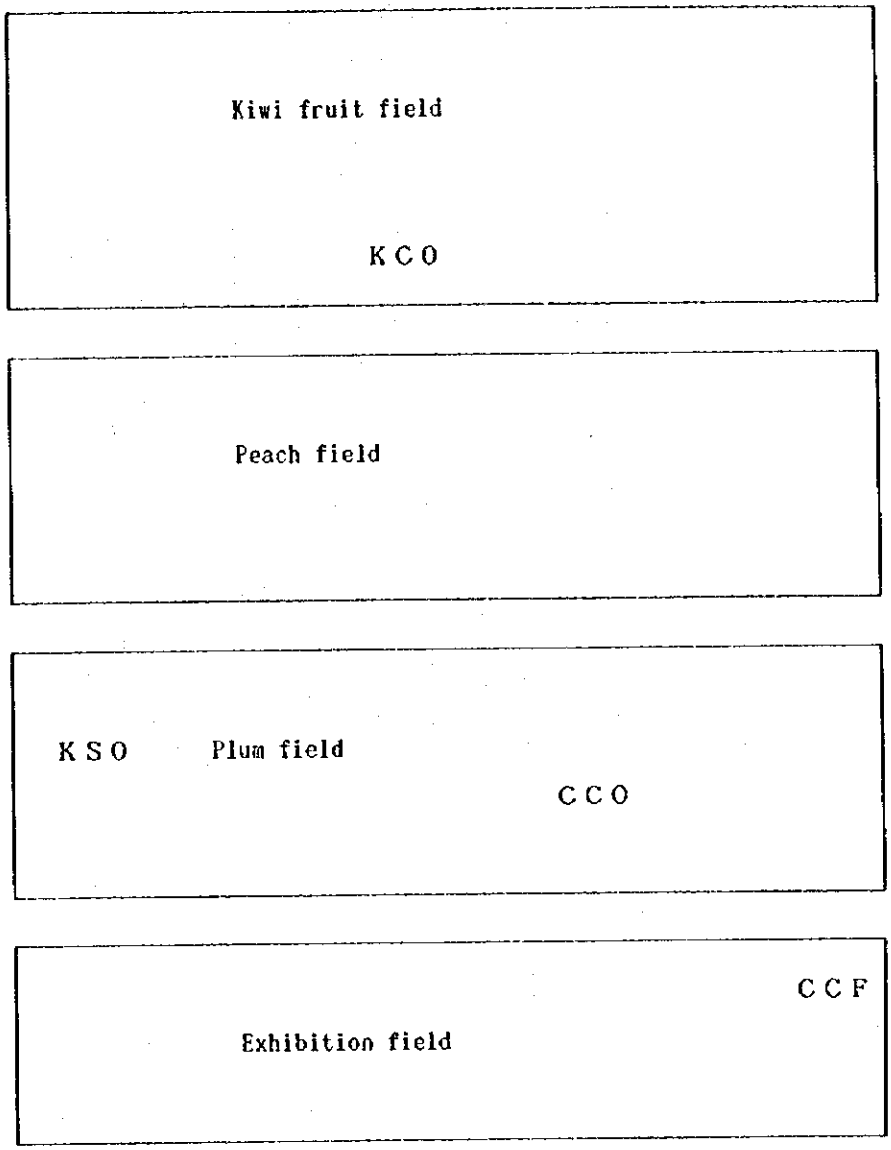

Fig.2-5-5 Soil system map of the orchards

Note: Sigos of soil system

K C O……Karahoyuk kili (black remains clay)

K S O……Karahoyuk siltli kili (black remains clay containing fine sand)

C C O……Cukurkamis kili orta (depression reed clay with medium permeability)

C C F……Cukurkamis kili fena (depression reed clay with poor permeability)

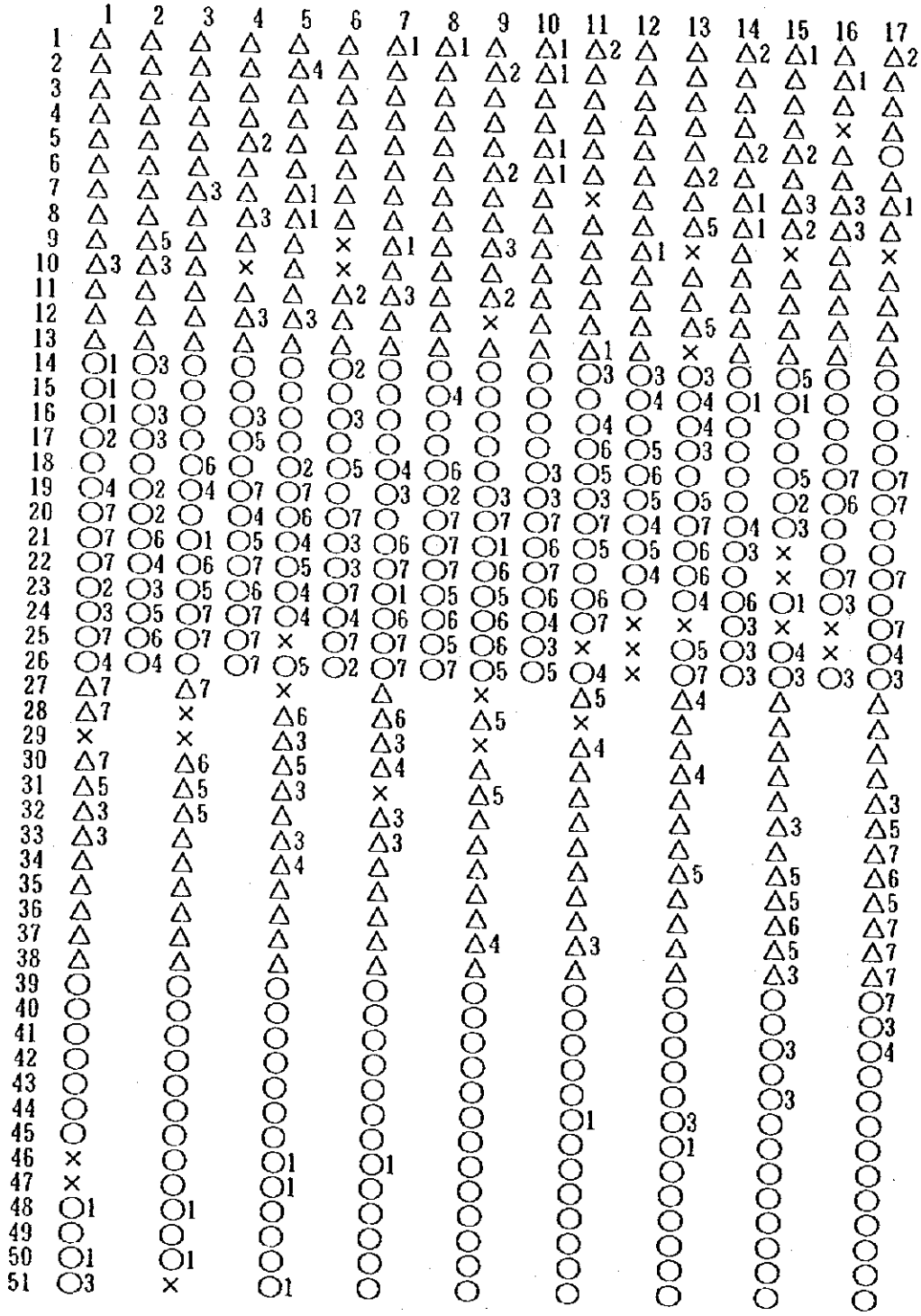

Fig. 2-5-6 Out of chlorosis in peach field (October, 1993)

Note: △ Early Red Numbers on right side are values about degree of chlorosis
○ Dixi Red
× Died tree by chlorosis etc.

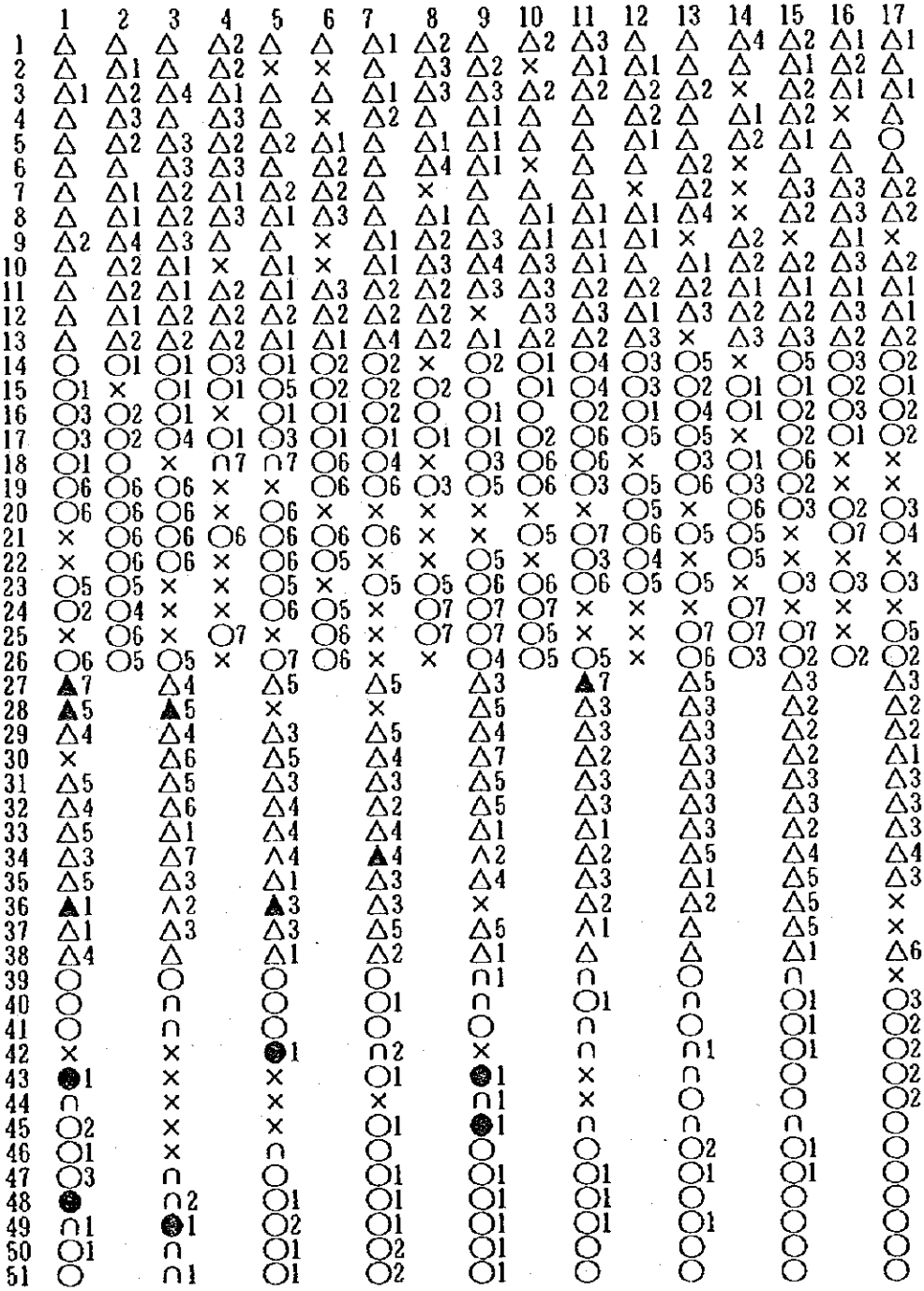

Fig.2-5-7 Outbreak of chlorosis and died trees in the peach field (May, 1995)

Note:

	Early Red	Dixi Red
Normal :	△	○
Weakened tree :	∧	∩
Dying tree :	▲	●
Died tree by chlorosis :	×	×

Number on right side are values about degree of chlorosis.

As shown in Figs., the portion of the field where chlorosis broke out in many trees was on the boundary between the dense planting section and the sparse planting section of the two varieties. As it was not suitable in this situation to examine a specific outbreak ratio for each variety, the result was obtained from the total of chlorosis trees of the two varieties. In October 1993, trees without chlorosis accounted for 55% of the total trees, with the remaining 45% of the trees having chlorosis of various degrees. In 22% of these trees, chlorosis exceeding Degree 5 was found. White leaves which could hardly carry out photosynthesis gave adverse effect to the growth of these trees. Among them, 12% showed Degree 7 or were already dead, and could not be expected to grow thick any longer.

One month after sprouting in 1995, seemingly healthy trees without chlorosis accounted for only 18%, and trees with chlorosis exceeding Degree 5 and dead trees accounted for 30%. Trees with chlorosis of the degrees between 1 and 4, whose recovery was possible by careful management, accounted for 52%.

The outbreak of chlorosis was a serious problem in conducting tests. The experiment team inspected several peach orchards in Turkey, in order to ascertain whether the disease broke out only in the experiment field or not. Chlorosis was found in most of the inspected orchards. In the early summer of 1995, some of the trees in these orchards did not sprout or suddenly died. According to the opinion of the professor specialized in fruit growing in Cukurova University, this was caused by ground water staying in the root zone. Although it was clear that sudden deaths were caused by stagnant ground water, there seemed additional causes of the outbreak of chlorosis, because it broke out even in peach orchards situated in slopes where it was impossible for ground water to stay. To the question what were concentrations of salts near the ground surface, the professor's answer was that those in the Cukurova district did not pose any problem. Regarding the fact that the soil was apt to show alkaline reaction, he did not seem to pay much attention. A professor specialized in pedology, however, pointed out that it posed a problem that soil of Turkey showed high pH value on the whole.

For the purpose of identifying causes of the outbreak of chlorosis, tests were conducted on soil water content and ground water, on alkaline reaction of the soil, and on soil ingredients (see sections below).

Table 2-5-9 shows the growth of the peach trees in these circumstances.

Yellow-flesh peaches generally sprout, leaf and flower earlier than white-flesh peaches. In both Dixi Red and Early Red, sprouting, leafing and flowering were earlier than white-flesh peaches of Japanese varieties, because both Dixi Red and Early Red were yellow-flesh varieties. Especially in 1995, sprouting, leafing and flowering were earlier than in the preceding two years by more than two weeks, but there were no injuries due to low temperatures such as late frost. Early Red trees grew faster in early spring than Dixi Red trees, showing they were an early-maturing variety. There was, however, no significant difference in the beginning of harvest between both varieties for the three years. The harvest of Early Red peaches was finished five days earlier than that of Dixi Red peaches in 1994. There was no difference in the other two years.

Table 2-5-9 Growth stage of peach trees (1993 - 1995)

Variety	Year	Date of sprouting	Date of leafing	Date of flowering	Date of full bloom	End of flowering	Date of harvest
Dixi Red	1993	Mar. 6	Apr. 5	Mar. 20	Mar. 25		Jun. 27-Jul. 13
	1994	Mar. 12	Mar. 25	Mar. 21	Mar. 30	Apr. 8	Jun. 16-Jun. 25
	1995	Feb. 28	Mar. 8	Mar. 2	Mar. 10	Mar. 16	Jun. 12-Jun. 23
Early Red	1993	Mar. 5	Apr. 3	Mar. 20	Mar. 25		Jun. 27-Jul. 13
	1994	Mar. 10	Mar. 22	Mar. 19	Mar. 28	Apr. 5	Jun. 16-Jun. 20
	1995	Feb. 25	Mar. 5	Mar. 1	Mar. 8	Mar. 14	Jun. 12-Jun. 23

There was thus slight difference in maturing period between these varieties, and harvesting time was much the same. It is impossible to avoid the concentration of harvesting labor when these varieties are cultivated in combination. It is necessary, therefore, to replace one of the varieties with another variety of peach which matures in a different time.

For the purpose of obtaining indicators of growth as of February 1996, the seventh and the last year of the test (after pruning), 20 trees (including those with chlorosis) were selected each at random from among 265 Dixi Red trees and 303 Early Red trees, and the girths 20 cm above the ground, tree heights (height up to the highest tip of branch), and crown lengths and widths were measured. The results are shown in Table 2-5-10.

Table 2-5-10 Growth of peach trees (February 1996)

Variety	Item		Largest	Smallest	Average	Standard deviation
Dixi Red	Girth of trunk	(cm)	47.0	21.0	34.58	5.14
	Crown Height	(m)	4.25	2.50	3.38	0.48
	Diameter I	(m)	4.25	1.95	3.10	0.56
	Diameter II	(m)	3.85	1.70	2.76	0.50
	Volume	(m^3)	66.83	6.80	37.17	7.04
Early Red	Girth of trunk	(cm)	50.5	21.5	36.50	4.23
	Crown Height	(m)	4.15	2.80	3.51	0.37
	Diameter I	(m)	4.30	2.00	3.13	0.57
	Diameter II	(m)	3.90	1.85	2.88	0.42
	Volume	(m^3)	68.70	10.36	38.82	7.56

Note: Crown Volume = Crown Height × Crown Diameter I × Crown Diameter II

Although there was little difference in tree growth between the varieties, difference was considerable among the Dixi Red trees, while difference was less considerable among the Early Red trees. Among the Dixi Red trees, the tree which had grown most had a girth of 47 cm and a crown volume of 66.83 m^3, while the smallest tree had a girth of only 21 cm and a crown volume of as small as 6.80 m^3. The difference was nearly 10 : 1. Among the Early Red trees, the tree which had grown most had a girth of 50.5 cm and a crown volume of 68.70 m^3, while the smallest had a girth of

21.5 cm and a crown volume of 10.36 m^3. The difference was slightly larger than 3 : 1.

The trees which showed poor growth were planted in places where the outbreak of chlorosis was considerable, and concentrated in the remains soil to the center of the experiment field.

The trees of both varieties without chlorosis generally showed good development of branches, except for the trees which died from suffocation of roots due to the heavy rain in November 1995. From the viewpoint of the growth of trees, these trees showed much the same results as those planted in Japan.

b. Fruit Production

The healthy trees began bearing fruit in 1992, three years after being planted. Table 2-5-11 shows harvests of peaches from 1993 through 1995.

Table 2-5-11 Harvests of peaches

Variety	Year	Beg. of harvest	End of harvest	Yield (kg)	Remarks
Dixi Red	1993	Jun. 28	Jul. 5	717.0	Two harvests, 30% in the first harvest
	1994	Jun. 16	Jun. 25	2,050.0	Four harvests, 54% in the fourth harvest
	1995	Jun. 16	Jun. 23	1,018.5	Peak: June 21
Early Red	1993	Jun. 28	Jul. 5	41.0	Two harvests, 45% in the first harvest
	1994	Jun. 16	Jun. 20	1,340.0	Two harvests, 64% in the second harvest
	1995	Jun. 12	Jun. 23	1,058.0	Peak: June 17

Yields in those three years were not satisfactory, in view of the extent of the growth of the trees. In 1994, yield was suddenly increased, seemingly showing a favorable tendency, while it declined slightly in 1995, the following year. This seemed to have been caused by the damage from standing water due to the torrential downpour in the fall of 1994, not only causing some of the trees to die but also giving adverse effect on the surviving trees. Let the writer review the yield of 1994, which was the largest. The unhealthy trees in the portion of one third of the field were not taken into account. The portion of two thirds, namely, 132 a, produced 256 kg of peaches per 1 da, five years after planting. This was a small yield. An ordinary yield should have exceeded 1,000 kg. The unusual weather in the early spring to the early summer of 1994 seemed to have affected the yield to a certain extent. That is, a northerly wind (called poyraz) raved over the district for three days unceasingly from April 21 through 23. In the maximum daily wind velocity of 14 m to 15 m, current shoots and fruit were scratched and young fruit dropped. Peaches, however, did not seem to be damaged by the wind. In May 4, there was a hailstorm for about five minutes after a sudden shower, injuring young leaves and young peaches as well. It was estimated that about 30% of the peaches were injured. Damage from these injuries, however, must have been slight,

because it happened just before fruit thinning.

After sprouting in 1995, there were no meteorological events which affected the yield of peaches. High temperatures exceeding 40 ℃, lasting for three days from May 22, did not injure peaches, either.

Unlike flowers of white-flesh peaches generally seen in Japan, flowers of yellow-flesh peaches of these two varieties were reddish and less conspicuous. Unlike the sight of ordinary peach gardens of Japan, they did not give a cheerful impression even in full blossom, showing that only a small number of flower buds appeared. Causes of this were not identified, but it seemed to be indirectly attributable to soil properties.

The numbers of trees of the two varieties subjected to the test were much the same. Although Early Red trees showed better growth than Dixi Red trees,the former produced a smaller yield than the latter every year during the three years of testing. The yield of Early Red was especially small in 1993, producing only 41 kg, which accounted for less than 6% of the yield of 717 kg of Dixi Red. This seemed to be attributable to the differentiation of only a small number of flower buds in the previous year, but causes could not be identified. In 1994, the yield was increased considerably both in Early Red and Dixi Red. The yield of Early Red, however, accounted for about 60% of that of Dixi Red. In 1995, the yield declined in both varieties. As shown in Fig. 2-5-7, more Dixi Red trees died from root suffocation caused by stagnant ground water, and a more decline in the yield of Dixi Red resulted. In this year, the yield of Dixi Red was smaller than that of Early Red.

Yields per 10 a were calculated, by the method mentioned above, for identifying relationships between yields and the age of trees for each variety. Early Red trees five years old produced 201 kg, while Dixi Red trees of the same age produced 308 kg, which were very small yields for the growth of the trees. These well-grown trees should have produced three times these yields.

Fruit quality of both varieties was almost satisfactory for early-maturing varieties. Table 2-5-12 shows characteristics of peaches harvested from 1993 to 1995.

Table 2-5-12 Quality of peaches

Variety	Year	Weight	Fruit diameter cm			Sugar content Brix	Remarks
		g	Long. dia.	Trans. dia. I	Trans. dia.II		
Dixi Red	1993	123.5	6.1	6.2	6.3	11.7	Reddish flesh, Semi-clingstone
	1994	177.2	7.2	6.8	6.9	14.0	Acid 1.65%, Rich taste
	1995	185.2	6.7	7.0	7.1	11.1	pH 3.3
Early Red	1993	117.9	5.9	5.7	5.8	12.2	Yellow,flesh, Much -acidity, Clingstone,
	1994	136.6	6.4	5.9	6.2	13.3	Acid 1.73%
	1995	168.2	6.6	6.9	6.6	12.9	pH 3.4

Note: Trans. dia. I .., transverse diameter on the suture side
Trans. dia. II .. transverse diameter at right angles to Trans. dia. I

In 1993, harvested peaches were small, but peaches grew larger year after year. Dixi Red peaches were a little larger than Early Red peaches, and both of them were almost satisfactory in size for early-maturing varieties. Peaches were round and shapely, yellow-flesh peaches with short trichome, and became so red that they appeared almost black. Sunlight was so intense that those peaches which were exposed to it got sunburnt in the portions exposed to the sun. Slight sunburn caused the color of peaches to change to brown, while serious sunburn caused depressions on peaches. It was necessary to carry out fruit thinning so that peaches at under side of bearing branch would be left. Dixi Red peaches had slightly gummy, yellow flesh with semi-clingstones around which a red color appeared. Early Red peaches had bright yellow flesh without a red color around their clingstones. Both varieties seemed a little late in softening, but they softened comparatively easily for yellow-flesh varieties. They must be harvested a little earlier, for the purpose of protecting them from injuries while being put on sale. In view of the present situation in Turkey in which peaches were sold, being piled in heaps, peaches had to be harvested about one week before full maturity, so that they would be hard enough to stand the above-mentioned way of selling.

Softened flesh was of comparatively fine grain with few fibers. In 1993 and 1995, sugar contents of Dixi Red were 11.7 Brix and 11.1 Brix, while those of Early Red were 12.2 Brix and 12.9 Brix, which were rather low. In 1994, the sugar content of Dixi Red was 14.0 Brix, while that of Early Red was 13.3 Brix, which were considerably high. Acidity was, however, considerably high, with that of Dixi Red being 1.63% and that of Early Red being 1.70%. This high acidity predominated over sweetness, and peaches tasted considerably sour. In peach harvesting time, the daily maximum temperature reached as high as 37 ℃, and this fact seemed to cause people of this district to prefer sour fruits.

There was no significant difference in appearance and taste between Dixi Red and Early Red, and harvesting periods were much the same. Only one outstanding difference was that Early Red was clingstone, while Dixi Red was semi-clingstone. In Dixi Red, flesh separated from stone very easily. As Turkish people eat peaches without peeling them, Dixi Red peaches would be preferred to clingstone Early Red peaches.

3) Plums

a. Growth of Trees

Unlike peaches, plums were not injured by chlorosis, though they were planted in the lot adjacent to the peach field across a road. As shown in Fig. 2-5-5, chlorosis did not break out despite the soil comprising not only the three kinds of soils of the peach field but also soil of poorer permeability. This clear difference in the outbreak of chlorosis between peach trees and plum trees, both of which were classified as the genus of Prunus, showed that adaptability differed greatly from species to species.

Although no outbreaks of chlorosis did not always resulted in steady growth of the trees, it was very advantageous from the viewpoint of agricultural management that there was no need to be worried about

chlorosis which was a great impediment to the growth of the trees.

As mentioned earlier, seedlings of three varieties were planted in a jumble, and consequently this produced complicated locations of the varieties. Fig. 2-5-8 shows the arrangement of the three varieties in the experiment field.

The numbers of trees of these varieties as of February 1996 were as follows.

Can	420
Papaz	106
Formosa	127
Those recognized as root stocks	3
Dead trees	11
Total	667

Table 2-5-13 shows the growth of the plum trees comprising three varieties.

Table 2-5-13 Growth stage of plum trees (1993 - 1995)

Variety	Year	Date of sprouting	Date of leafing	Date of flowering	Date of full bloom	End of flowering	Date of harvest
Can	1993	Mar. 18		Mar. 6		Mar. 31	May 15, Jun. 16*
	1994	Mar. 8	Mar. 20	Mar. 1	Mar. 21	Mar. 30	May 30, Jun. 13*
	1995	Feb. 20	Mar. 5	Feb. 15	Feb. 26	Mar. 16	May 4, Jun. 19
Papaz	1993	Mar. 17		Mar. 5		Mar. 28	Jun. 18-Jun. 21
	1994	Mar. 10	Mar. 25	Mar. 10	Mar. 25	Apr. 2	Jun. 9-Jun. 22
	1995	Feb. 23	Mar. 8	Feb. 20	Mar. 1	Mar. 16	Jun. 13-Jun. 16
Formosa	1993	Mar. 19		Mar. 7		Mar. 31	Jun. 24-Jun. 28
	1994	Mar. 10	Mar. 30	Mar. 15	Mar. 31	Apr. 5	Jun. 22-Jun. 28
	1995	Feb. 23	Mar. 10	Feb. 25	Mar. 10	Mar. 20	Jun. 19-Jul. 6

Note: * Two harvests consisting of immature picking in conformity with Turkish practice and mature picking.

In the three varieties, sprouting and leafing were considerably early, and flowering began early, while it ended late, resulting in prolonged flowering. Especially in Can, flowering lasted for as long as 25 days to 31 days. Flowering lasted for 23 days to 25 days in Papaz and for 21 days to 24 days in Formosa. This may have been caused by insufficient low temperatures during winter, but did not seem to give adverse effect on fruit bearing. A small number of flowering buds resulted in the fact that the number of plums was not satisfactory for the sizes of the trees.

Regarding harvesting periods, Can plums were usually harvested and shipped about one month before maturing time, for meeting the demand of

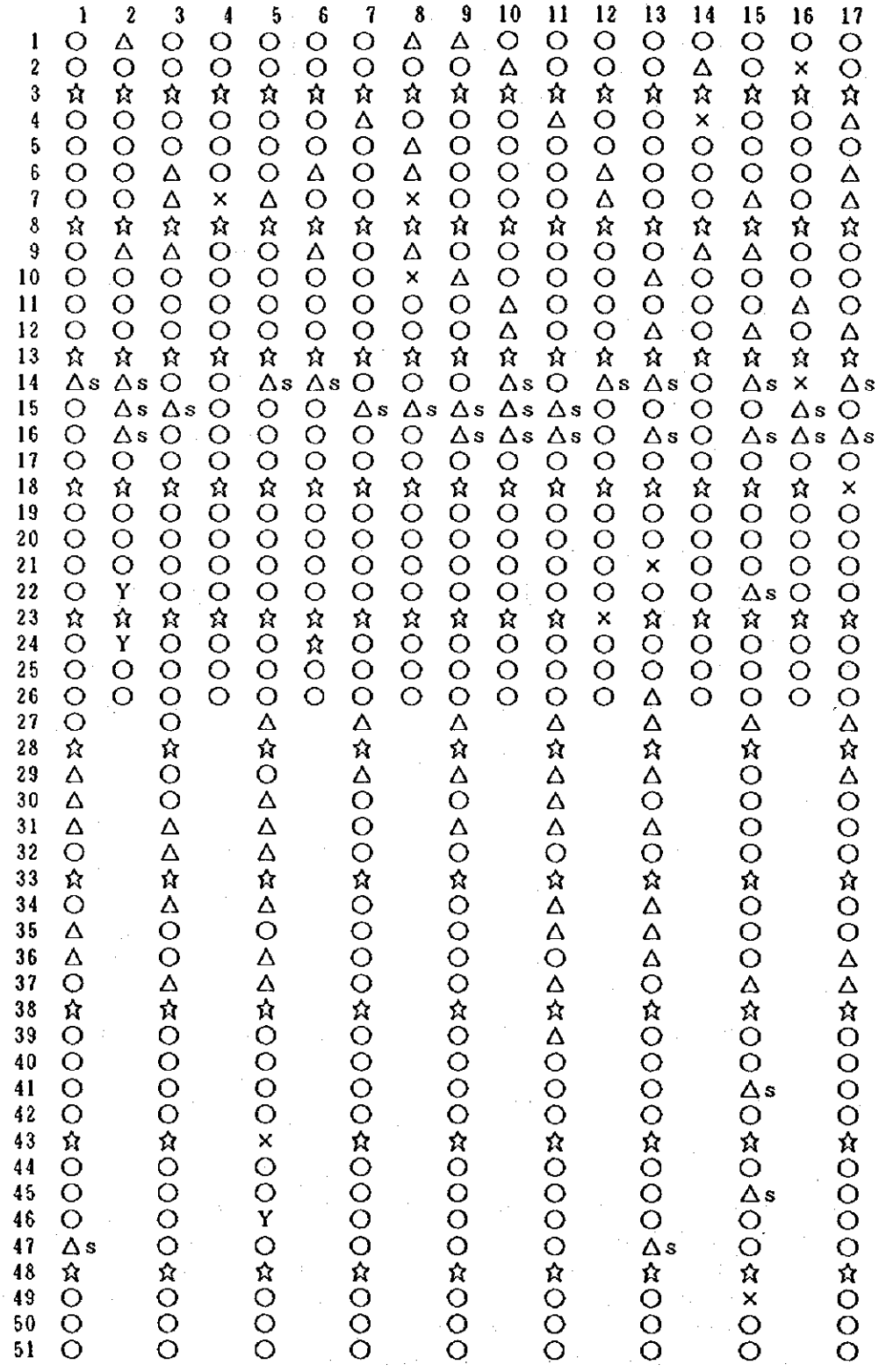

Fig.2-5-8 Existing state of plum field(February, 1996)

Note: △ ; Papaz, ○ ; Can, ☆ ; Formosa, △s ; Yellow Papaz ,
Y ; Tree recognized rootstock

Turkish people who liked sourish fruits. In the city of Adana in the middle of May, deep green, hard plums were often sold on the roadside, piled in heaps. In view of the fact that matured Can plums were seldom sold, it seemed advisable to harvest Can plums about one month before maturing time. Papaz and Formosa plums were harvested in ordinary maturing time.

For the purpose of obtaining indicators which showed growth conditions as of February 1996 (after pruning), the seventh and last year of tests, 20 sample trees were selected at random each from among 460 Can trees, 77 Papaz trees and 130 Formosa trees. The girths 20 cm above the ground, the heights (to the tip of the highest branch), and the lengths and widths of the crowns of these trees were measured. Table 2-5-14 shows the results.

Table 2-5-14 Growth of plum trees (February 1996)

Variety	Item		Largest	Smallest	Average	Standard deviation
Can	Girth of trank	(cm)	45.7	31.0	38.48	3.22
	Crown Height	(m)	3.65	3.10	3.38	0.54
	Diameter I	(m)	3.90	2.90	3.40	0.23
	Diameter II	(m)	3.75	2.25	2.95	0.21
	Volume	(m^3)	53.38	20.23	36.81	1.44
Papaz	Girth of trank	(cm)	53.0	32.5	42.75	3.96
	Crown Height	(m)	3.84	3.35	3.60	0.52
	Diameter I	(m)	4.15	3.10	3.63	0.26
	Diameter II	(m)	3.80	2.20	3.00	0.21
	Volume	(m^3)	60.56	22.85	41.70	3.01
Formosa	Girth of trank	(cm)	37.5	25.2	31.35	4.13
	Crown Height	(m)	3.65	2.84	3.25	0.33
	Diameter I	(m)	2.20	1.46	1.83	0.24
	Diameter II	(m)	1.85	1.37	1.61	0.17
	Volume	(m^3)	14.85	5.68	10.27	2.02

Note: Crown Volume = Crown Height X Crown Diameter I X Crown Diameter II

The Can trees, which were largest in number, grew most evenly, with well-balanced lengths and widths, showing satisfactory growth. The largest tree had a girth of 45.7 cm with a crown volume of 53.38 m^3, while the smallest had a girth of 31.0 cm with a crown volume of 20.23 m^3. The volume ratio was about 2.6 : 1, which showed that difference was slight.

In the end of July, however, a great deal of orange-colored powdery matter was found on the undersides of a number of leaves. This powdery matter looked like pathogenic fungi such as aeciospores, seemingly causing early abscission of leaves. According to a professor specialized in pathology in Cukurova University, this was rust caused by fungi called Tranzschelia discolor, which broke out especially in the Can variety. The professor seemed to put little importance to it, because it appeared on leaves only,producing little damage. Still, it should not be made light of, if it were to be the cause of early abscission of leaves. It seemed that a small number of flower buds, despite the satisfactory growth of the trees, was a result of early abscission caused by these fungi. A rust control test was conducted separately (see another section).

The Papaz trees were vigorous and grew more than the Can trees. Some of

them, however, did not grow so much, causing uneven growth of the trees on the whole. The largest tree had a girth of 53.0 cm with a crown volume of 60.56 m^3, while the smallest had a girth of 32.5 cm with a crown volume of 22.85 m^3. The volume ratio after pruning was about 2.6 : 1, showing little difference from the conditions of the Can trees.

The Formosa trees did not show especially poor growth. They, however, developed few of their branches horizontally, because they grew upright by nature. As they grew upright, they became high but slender, showing only a slight increase in crown volume. The largest tree having a girth of 37.5 cm had a crown volume of only 14.85 m^3, while the smallest had a girth of 25.2 cm with a crown volume of as small as 5.68 m^3. It was thought possible to increase crown volume by taking measures for spreading well-grown branches. Satisfactory results, however, were not produced from branch propping and pulling down branches with poles and ropes.

b. Plum Production

Fruit bearing began in 1992, three years after planting. Table 2-5-15 shows fruit bearing and harvests from 1993 to 1995.

Table 2-5-15 Production of plums

Variety	Year		Beg. of Harvest	End of Harvest	Yield kg	Remarks
Can	1993	Early		May 15	145.0	Immature picking according to Turkish practice
		Mature		June 16	91.0	Picked at one time
	1994	Early		May 30	678.0	Immature picking
		Mature		June 13	594.0	Picked at one time
	1995	Early	May 1	May 24	3,292.5	Peak: May 4
		Mature	June 8	June 23	3,361.0	Peak: June 9
Papaz	1993			June 21	104.1	Picked at one time
	1994		June 9	June 22	299.5	Picked twice, 70% in the first picking
	1995		June 13	June 19	4,411.0	Peak: June 15
Formosa	1993		June 24	June 28	242.0	Picked twice, 30% in the first picking
	1994		June 22	June 28	176.0	Picked twice, 50% in the first picking
	1995		June 19	July 5	1,034.5	Peak: June 21

In 1993, the yield of Formosa plums was largest, despite the slow growth of the trees, followed by Papaz plums and Can plums in that order. The yield of Can plums was smallest, despite the largest number of trees showing satisfactory growth. This was caused partly by the practice in this district of picking Can plums, which were small in size, one month earlier than maturing time, before plums became fat enough.

In 1994, the yields of Can and Papaz plums increased considerably. The production of Can plums was 1,272 kg in total, despite their being picked before maturing time, while the production of Papaz plums was 229 kg. The production of Formosa plums, however, was 176 kg, which was slightly smaller than that in 1993. Although this was attributable mainly to a small number of flower buds in the previous year, it was caused also by comparatively heavy pruning in the preceding winter, where heading was carried out for the purpose of making the trees short. This produced a larger number of developing branches and thereby impeded the differentiation of flower buds.

In 1994, a spring wind raved over the district in April 23 and 24, and many plums were caused to fall. The dropped plums of the three varieties weighed 111.5 kg. Most of them seemed to be Can plums. The average weight of the dropped Can plums was 4.16 g, which would have increased to 21.6 g by maturing time. The dropped Can plums would have reached 578 kg by maturing time. This showed that nearly one third of the yield of Can plums was lost.

The calculation of yields per 1 da for 1994, according to the number of trees of each variety, showed the yield of Can was 92.2 kg, that of Papaz was 130.2 kg, and that of Formosa was 45.1 kg. The yield of Can became 134.1 kg, nearly equal to that of Papaz, if the weights at maturing time of the plums damaged by the wind were added to the yield. The yields of these two varieties, however, were about one third of the average yield from trees of this size in Japan. The yield of Formosa plums was too small to be compared with the average yield in Japan.

In 1995, there was a sudden increase in yield. In terms of yields per 10 a(1 da),the yield of Can (126 a/12.6 da) was 528.0 kg, which comprised 261.3 kg in early picking and 266.7 kg in mature picking. The yield of Papaz (32 a/3.2 da) was 1,379.3 kg, while that of Formosa (38 a/3.8 da) was 272.2 kg. The control of rust in the previous year for the purpose of protecting Can trees from early abscission of leaves seemed to have contributed to the differentiation of flower buds. But this yield did now show fruit bearing in full scale. The yield of Papaz plums was very large, showing an above-average result. Trees bore so many plums that some branches broke. The yield of Formosa, which increased considerably, did not yet reach its normal condition. Yields, however, would improve gradually, as the Formosa trees grew steadily.

Table 2-5-16 shows characteristics of harvested plums.

Can plums, which were small, showed the highest sugar content through the three years in their maturing time, ranging from 16.1 Brix to 16.8 Brix. Can plums were, however, less fragrant, with a low acidity of 0.63% in 1994 and pH 4.8 in 1995, and a little unsatisfactory in taste. Immature-picked ones had higher acidity, though sugar content was a little smaller, and seemed to taste good. Turkish people, being well aware of this, may have been picking Can plums earlier than their maturing time. Still, the harvest on May 2, 1995 seemed one week earlier. The average fruit weight was 8.0 g, which was about half the average fruit weight of 15.2 g on May 15. Too early picking proved to produce no advantages. It was advisable, however, to harvest plums at this time, partly for the

Table 2-5-16 Characteristics of plums

Variety	Year		Date of harvest	Fruit wt. g	Trans. dia. I cm	Trans. dia. II cm	Long. dia. cm	Sugar content Brix	Acidity %	Skin color
Can	1993	Mature	June 16	26.1	3.2	3.5	3.0	16.1		Light green
	1994	Immature	May 30	18.8	3.3	3.0	3.1	11.6	1.78	Green
		Mature	June 13	21.6	3.3	3.1	3.1	16.6	0.63	Very light green
	1995	Immature	May 2	7.2	2.3	2.3	2.2	8.0	(pH 2.4)	Green
		Immature	May 15	18.9	2.9	3.0	3.3	15.2	(pH 3.6)	Slightly light green
		Mature	June 9	20.3	3.1	3.2	3.2	16.8	(pH 4.8)	Light green
Papaz	1993		June 21	28.3	3.6	3.9	3.6	13.6		Red on light yellow ground
	1994		June 9	17.3	3.2	3.0	2.8	13.6	0.95	Same as above
	1995		June 19	32.9	3.5	4.1	3.7	14.5	(pH 4.7)	Same as above
Formosa	1993		June 24	62.6	4.9	4.9	4.9	13.4		Bright red on light yellow ground
	1994		June 23	86.2	5.2	5.3	5.3	16.3	0.88	Same as above
	1995		June 19	109.5	5.7	5.7	5.5	14.3	(pH 4.6)	Same as above

purpose of fruit thinning, where trees bore too many plums, as in Papaz trees in 1995.

Papaz plums were small in 1994, with the average fruit weight being 17.3 g. In 1993 and 1995, fruit weights of Papaz plums were 28.3 g and 32.9 g on the average. They were larger than Can plums, with a slightly lower sugar content between 13.6 Brix to 14.5 Brix, but had adequate acidity of 0.95% and pH 4.7, producing better taste than Can plums. The appearance of deep red Papaz plums was brilliant. In 1993, they reached maturing time on June 21, five days later than Can plums whose maturing time came on June 16. In 1994, they reached maturing time on June 9, four days earlier than Can plums whose maturing time came on June 13. In 1995, Papaz plums were harvested last, being picked on June 19, 10 days later than the harvest of Can plums which took place on June 9. There were such fluctuations in harvesting time of Papaz plums, but maturing time seemed to come to Papaz plums slightly later than to Can plums, because Papaz plums were picked a little too early in 1994. Where Papaz and Can plums are cultivated in combination, the overlapping of harvest can be avoided by early picking of Can plums and mature picking of Papaz plums.

Formosa plums, weighing 62.6 g, 86.2 g and 109.5 g per fruit on the average in 1993, 1994 and 1995, were largest of the three varieties, showing an gradual increase year after year. They had a considerably high sugar content of 13.4 Brix to 16.3 Brix, with adequate acidity of 0.88 and pH 4.6 and an agreeable flavor. They tasted good. They were almost round and not only shapely but also beautiful, with a skin color of bright red on a light yellow ground. Formosa plums were most satisfactory in quality, but their only weak point was that trees grew upright, which made it difficult to train their branches to spread horizontally for higher yields.

2-5-2. Other Tests on Kiwi Fruit, Peaches and Plums

(1) Kiwi Fruit

1) Test on Combination of Mini Sprinkler Irrigation and Herbaceous Plants (1994 - 1995)

a. Purpose

Experimental cultivation was under way with drip irrigation. This method of irrigation was advantageous, from the viewpoint of water economy, for the reason that dripping water, immediately permeating soil,was efficiently utilized. This irrigation method, however, sometimes caused a considerable rise of soil temperature near the ground surface, and was not effective for keeping the air humid. To cope with the situation, a combination of herbaceous plants and mini sprinklers (also for maintaining the plants) was introduced, with a view to providing shadows over the ground surface and increasing humidity in the air through transpiration from leaves, and the results were examined.

b. Test Method

In the kiwi fruit field, where experimental cultivation with drip irrigation was under way, six rows were selected as the herbaceous plant section with mini sprinklers.

In the drip-irrigated rows, two emitters were provided for each tree. In the herbaceous plant section, the emitters were replaced by mini sprinklers, to which water was sent simultaneously with drip irrigation. A mini sprinkler was capable of sprinkling water over an area of a two-meter radius. When 46 mini sprinklers (the same number as emitters, whose number was twice the number of trees in a row) were installed on a plastic hose with a diameter of 19 mm, insufficient water pressure resulted in insufficient sprinkling. For the purpose of causing them to work simultaneously with drip irrigation, two hoses were laid in each row where mini sprinklers were installed, with 23 mini sprinklers being installed on one hose and additional 23 on the other hose, totaling to 46 mini sprinklers per row. Irrigation in this way caused each emitter to drip 9 liters of water in an hour and each mini sprinkler to sprinkle 30 liters of water in an hour.

On March 17, 1994, Ladino clover were seeded in the rows installed with mini sprinklers. A seeding bed 2 m wide was provided on either side of the kiwi fruit row, and Ladino clover seeds sent from Japan were broadcasted, after sufficient weeding and soil preparation. The seeds were not covered with soil, and fed with water gently from a spray. Watering was carried out every day for about two weeks until germination was completed.

A wheat straw mulch section was provided, with a view to making a comparison with the herbaceous plant section. A straw mulch 4 m wide was laid on either side of a kiwi fruit row, as in the case of the herbaceous plant section. These wheat straws, having been collected with compression-packing machines for grass, after harvesting wheat with combines, were almost straw dust, which would not stay where it was laid. Moreover, these straws were easily moved by slightly strong winds, because they were dry and light due to the dry weather without precipitation, making it difficult to maintain the straw mulch rows. It may become necessary to exclude the straw mulch rows from the test.

c. Test Results

Ladino clover showed steady germination on the whole, and grew thick enough to play the role of a herbaceous plant section by June 1994.

The mini sprinklers watered the Ladino clover in adequate width, assisting their growth.

For the purpose of identifying effects of Ladino clover on the growth of kiwi fruit trees, 10 trees were selected each at random from among the trees in the herbaceous plant section and in the naked section, and the girths, the numbers of current shoots, and the degree of the development of main branches of these trees were measured. Table 2-5-17 shows the results.

Table 2-5-17 Comparison of growth of kiwi fruit trees between the herbaceous plant section and the naked section

Section	Girth cm	Current shoots per tree	Development of main branches cm
Clover sect.	12.8	23	294
Naked sect.	14.6	29	346
Limit of significant difference	1.8	3.6	43.2

The above-mentioned results showed that trees grew less in the clover section than in the naked section, contrary to expectations, though the mini sprinklers fed water more than three times the amount fed by drip irrigation. As the roots of kiwi fruit trees were distributed shallowly (see the Survey on Root Groups), they competed directly against clover roots, and this resulted in insufficiency in both water and nourishment.
It was concluded that herbaceous plant cultivation using Ladino clover was not effective in the experiment field.

2) Test on Fattening Promotion Treatment (1993)

a. Purpose

Kiwi fruit were generally small, and people often preferred larger fruit. To meet the situation, a test was conducted on kiwi fruit fattening by hormone treatment.

b. Test Method

Kiwi fruit were immersed in "Furumet", a growth regulator whose main ingredient was horchlorphenylone, which worked similarly to cytokinin.

Immersion was carried out on June 4, 20 days after flowering. Young kiwi fruit were immersed in a solution with an ingredient concentration of 10 ppm.

c. Test Results

Table 2-5-18 shows the harvest on November 16 of those kiwi fruit subjected to immersion.

Table 2-5-18 Effect of Furumet on kiwi fruit (1993)

	Fruit wt. g	Trans. dia. I cm	Trans. dia. II cm	Long. dia. cm	Sugar content Brix
Treated	105.7	5.7	5.1	6.9	8.5
Not treated	81.3	5.1	4.7	6.1	9.1

Kiwi fruit subjected to immersion grew considerably larger than those not subjected to immersion, showing that the treatment was effective for fruit enlargement. Kiwi fruit subjected to the treatment grew larger by

13% in length, by 11.5% in width, by 8% in thickness, and by 30% in weight.

Regarding appearance, trichome on the fruit surface seemed slightly longer and fruit shape was a little flat. These were, however, not signs of inferior quality but signs of improvement in quality as a commodity.

A similar test was conducted in 1992, the preceding year, and the results were much the same, though the test was finished earlier because of the expiration of the expert's term.

3) Test on Artificial Pollination (1993)

a. Purpose

As kiwi fruit have entmophilous flowers, there is no problem in pollination if flower-visiting insects work adequately. Unsatisfactory results are, however, apt to be produced in natural condition. A test on artificial pollination was conducted in the flowering time and its effects were examined.

b. Test Method

On May 5, when flowers of Hayward, a female variety, were in full bloom, they were pollinated with flowers of Tomuri, a male variety. Tomuri flowers which had just opened were collected and rubbed against Hayward flowers.

c. Test Results

Table 2-5-19 shows the harvest on November 16 of kiwi fruit subjected to artificial pollination.

Table 2-5-19 Result of artificial pollination of kiwi fruit (1993, Hayward)

	Date of harvest	Weight g	Sugar content Brix	Trans. dia. I cm	Trans. dia.II cm	Long. dia. cm
Pollinated	Nov. 16	81.3	9.60	5.1	4.7	6.1
Not pollinated	Nov. 16	63.1	10.07	4.8	4.4	5.5

Effect of artificial pollination was apparent in the size of fruit. Those berries subjected to artificial pollination were heavier by 28.8% than those not artificially pollinated. There was no significant difference in sugar content. Pollination promoted fruit enlargement, and it was concluded that quality was improved consequently as a commodity.

4) Test on Alkaline Soil Correction (1993 - 1996)

a. Purpose

The experiment field had alkaline soil, whose lime content accounted

for around 20%, showing pH between 7.3 and 7.9. Chlorosis which appeared on leaves of kiwi fruit during the test was partly attributable to alkaline soil reaction. It was effective in controlling occurrences of chlorosis to take measures for the correction of this soil alkalinity.

b. Test Methods

(a) Test by Sulfur Powder

A test was conducted on the correction of alkalinity of the soil, by sprinkling sulfur powder on the surface of the soil near the roots of trees and mixing it with the soil. For this purpose, three rows of kiwi fruit trees were selected, and 50 g of sulfur powder was administered to each of the trees.

Treatment was administered on June 11, 1993. Sulfur powder was sprinkled over the soil in a circle with a radius of 50 cm, with each tree as the center, and mixed with surface soil. On June 16, there was a precipitation of 4 mm, which made sulfur powder settle down in the soil.

A survey before treatment was conducted on June 10, 1993, and the results were studied on May 16, 1994. Those rows adjacent to the rows subjected to treatment were selected as a control.

(b) Test by Peat Moss

Peat moss, being sometimes used as a material to supply organic matter to soil and showing strong acidity with pH of 5.0, was laid around the roots of trees. One hundred liters of peat moss was laid around each tree in a 1 m radius, and mixed with soil to a depth of about 5 cm. Treatment was administered on March 31, 1995 for 12 alternate trees. Although effects of peat moss was not thought to be apparent in a short period of time, the extent of chlorosis was examined on October 15 of the same year, and the girth of each tree, the number of current shoots, as well as the spread toward the main branch were measured. It was planned that the conditions after the spring of the following year would be surveyed.

c. Test Results

(a) Test by Sulfur Powder

Table 2-5-20 shows chlorosis outbreaks in the treated trees and in the control.

As a means of showing the situation of chlorosis outbreaks in each row, it was assumed that an outbreak index was obtained by multiplying the value of degree of chlorosis by the number of trees which fell under the degree. A comparison was made between the rows subjected to treatment and the rows not subjected to treatment. There were 26, 20 and 20 outbreaks in June of the preceding year in the three rows not subjected to treatment, while there were 23, 17 and 18 outbreaks in May this year, showing a slight decrease. In the rows subjected to treatment, there were 20, 18

Table 2-5-20 Effect of sulfur powder on chlorosis outbreaks in kiwi fruit (1993 - 1994)

Row No.	Total trees	No. of trees by degree of chlorosis											
		Before sprinkling (June 1993)						After sprinkling (May 1994)					
		1	2	3	4	5	total	1	2	3	4	5	total
Treated rows													
3	42 trees	1	1	3	2	0	7	1	0	3	1	0	5
	Outbreak index #	1	2	9	8	0	20	1	0	9	4	0	14
5	39 trees	0	2	2	2	0	7	2	1	2	0	0	3
	Outbreak index	0	4	6	8	0	18	2	2	6	0	0	10
6	21 trees	0	2	3	1	1	7	3	0	2	1	0	5
	Outbreak index	0	4	9	4	5	22	3	0	6	4	0	13
Rows not treated													
7	41 trees	2	3	2	3	0	10	1	2	2	3	0	8
	Outbreak index	2	6	6	12	0	26	1	4	6	12	0	23
9	44 trees	4	5	2	0	0	11	5	3	2	0	0	10
	Outbreak index	4	10	6	0	0	20	5	6	6	0	0	17
8	22 trees	3	2	1	0	2	8	5	2	0	1	1	9
	Outbreak index	3	4	3	0	10	20	5	4	0	4	5	18

Note: # Outbreak index = Value of degree x No. of trees of the degree

and 22 outbreaks in the preceding year, which were decreased to 14, 10 and 13, respectively, in May of the following year. In other words, outbreaks of chlorosis declined by 12%, 15% and 10%, respectively, in the rows not subjected to treatment, while they declined by 30%, 44% and 41%, respectively, in the rows subjected to treatment. It was verified that soil treatment with sulfur powder was effective for controlling outbreaks of chlorosis to a certain extent.

In order to ascertain whether this effectiveness was produced by lowered pH of the soil or not, the study team entrusted Cukurova University with soil analysis, with a view to making a comparison of pH between the preceding year and this year. The value of pH, however, proved to be higher this year than in the preceding year.

In the team's opinion, this may have been resulted from the fact that the soil sample this year was collected near a tree subjected to treatment, while the sample of the preceding year was collected in a different place of the kiwi fruit field, for the purpose of understanding the soil environment of the entire field. Even such being the case, it was thought there was no problem in soil analysis, because the sample had been collected at the same depth as this time.

Although change of pH was not ascertained, it was possible to reduce chlorosis outbreaks in kiwi fruit to a certain extent, by administering sulfur powder to the soil. It seemed, however, difficult for this treatment to improve soil to its depths.

(b) Test by Peat Moss

Table 2-5-21 shows the results surveyed one season after treatment.

Table 2-5-21 Effect of soil treatment with peat moss (1995 -)

	Degree of chlorosis	Girth cm	No. of cur. shoots	Spread of branch
Treated	1.25 (1-3)	11.8 (1-3)	23.6	217.5
Not treated	1.27	12.2	24.3	200.7
Limit of significant difference	0.34	2.5	5.1	26.6

Note: For the values of degrees of chlorosis, refer to Note 1 of Table 2-5-7.

The survey in this period of time showed no effect on the degrees of chlorosis outbreaks and on the degree of tree growth. In one and the row where trees were selected for treatment, three among 12 trees to be used as a control died, and one of 12 trees selected for treatment died. As many trees died that year from suffocation due to stagnant ground water during the winter, it was not certain whether the difference in number of withered trees was correlated with peat moss treatment or not.

5) Survey on the Roots of Kiwi Fruit Trees

a. Purpose

Regarding two six-year-old trees (planted in February 1990), which were assumed to have died from excessive humidity of the soil lasting for as long as three months after the torrential downpour from November 18 through 21, 1994, that recorded a precipitation of 238.5 mm, a survey on their roots was conducted, for the purpose of identifying the causes of withering and understanding the distribution of roots of kiwi fruit trees in the experiment field.

b. Survey Method

The survey was conducted on June 6 and 7, 1995, when the two trees were considered completely withered. Circles were drawn on the surface of the ground, with radii of 30 cm, 50 cm, 70 cm and 90 cm, with a tree being the center. First, the survey team dug down the ground outside the 90 cm radius circle, carefully searching roots until they became confident of nonexistence of roots. Then the team dug down the ground within the range between the 70 cm radius circle and the 90 cm radius circle in the similar manner, and cut and collected the roots which existed within this range, at positions on the 70 cm radius circle. Then the team dug down the ground within the range between the 30 cm radius circle and the 50 cm radius circle, and surveyed and collected the roots which existed within this range. In cutting the roots, the team observed the depths of

them below the ground surface. Regarding the range within the 30 cm radius circle, the team surveyed the distribution of roots at every 20 cm depths.

The thicknesses of the roots was measured at the positions nearest to their bases. The roots were classified into roots with diameters not exceeding 2 mm, roots with diameters between 2 mm and 4 mm, roots with diameters between 4 mm and 8 mm, roots with diameters between 8 mm and 12 mm, and roots with diameters exceeding 12 mm, and the number of roots in each classification was counted. The team attempted to identify effective forces of root distributions, by creating effective force indexes (tentatively so named) according to root thicknesses, taking into account their conductive force. Those roots with diameters not exceeding 2 mm were given an effective force index of 1, those with diameters between 2 mm and 4 mm were given 2, those with diameters between 4 mm and 8 mm were given 4, those with diameters between 8 mm and 12 mm were given 6, and those with diameters exceeding 12 mm were given 8. Distribution volume of effective force was obtained by multiplying the effective force index of a classification by the number of trees in that classification.

Tables 2-5-22 and 2-5-23 show the survey results.

In both two trees, 75% to 82% of the roots were distributed horizontally within the 50 cm radius circle. Even the longest one was within the 90 cm radius circle. At depths of 3 cm to 20 cm from the ground surface, 73% to 86% of the roots were distributed vertically, with the longest one being 35 cm to 45 cm deep.

All of the fine roots had been withered, and withering had reached those roots whose diameter was about 1 cm. It was difficult to attribute the withering of these trees only to excessive humidity affecting thus superficial soil. It seemed that the outbreak of chlorosis in the preceding year was another cause of the withering of these roots.

Table 2-5-22 Number of kiwi fruit roots by thickness at the given distances and depths ①
Variety: Hayward, full five years after planting
Row 16, No. 17 tree
Girth: 9.2 cm
Main branch length after straight-line training
135 cm westward, 77 cm eastward

Distance from tree (Effective force index)	Number of roots by thickness* and effective force distribution (shown in parentheses)** Less than 2mm (1)	2-4mm (2)	4-8mm (4)	8-12mm (6)	More than 12mm (8)	(Total)	%
Radius							
Above 90cm	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	(0)	0
70 - 90 cm	6 (6)	3 (6)	3(12)	2(12)	0 (0)	(36)	8
50 - 70 cm	21(21)	7(14)	6(24)	3(18)	0 (0)	(77)	17
30 - 50 cm	25(25)	15(30)	4(16)	7(42)	7(56)	(154)	35
Under 30cm	5 (5)	12(24)	9(36)	8(48)	8(64)	(177)	40
Depths within 30 cm radius circle							
0 - 20 cm	3 (3)	5(10)	4(16)	6(36)	8(64)***	(129)	73
20 - 40 cm	2 (2)	7(14)	5(20)	2(12)	0 (0)	(48)	28
Above 40cm	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	(0)	0

Notes 1: (*) Root thickness was expressed by the diameter at the position nearest to the root base.
2: (**) Conductive forces were estimated according to root thicknesses and given corresponding effective force indexes. Effective force was obtained by multiplying the effective force index by the number of trees.
3: (***)Breakdown of the eight roots:
30 mm thick: two roots
25 mm thick: one root
20 mm thick: two roots
15 mm thick: two roots
12 mm thick: one root
4: There were no roots beyond the 90 cm radius circle.
5: Within the range between the 70 cm radius circle and the 90 cm radius circle, most roots were distributed in the eastern side at depths between 4 cm and 12 cm. One root 2 mm thick was found 6 cm to the west.
6: Within the range between the 50 cm radius circle and the 70 cm radius circle, all the roots were distributed at depths between 3 cm and 32 cm, and the range between 5 cm and 25 cm had the largest number of roots.
7: Within the range between the 30 cm radius circle and the 50 cm radius circle, the roots were found at depths between 4 cm and 22 cm. There were no deeper roots.
8: When soil was removed up to a depth of 20 cm within the 30 cm radius circle, most roots appeared. Only a few roots were deeper than 20 cm, and the longest root reached a depth of 35 cm.

Table 2-5-23 Number of kiwi fruit roots by thickness at the given distances and depths ②

Variety: Hayward, full five years after planting
Row 13, No. 22 tree
Girth: 7.0 cm
Main branch length after straight-line training
95 cm westward, 70 cm eastward

Distance from the tree (Effective force index	No. of roots by thickness and effective force distribution: Less than 2mm (1)	2-4mm (2)	4-8mm (4)	8-12mm (6)	More than 12mm (8)	(Total)	%
Radius							
Above 90cm	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0
70 - 90 cm	5 (5)	1 (2)	0 (0)	0 (0)	0 (0)	6 (7)	2
50 - 70 cm	8 (8)	12(24)	7(28)	0 (0)	0 (0)	27 (60)	16
30 - 50 cm	18(18)	17(34)	8(32)	6(36)	2(16)	51(136)	37
Under 30cm	1 (1)	5(10)	10(40)	10(60)	7(56)	33(167)	45
Depth within the 30 cm radius circle							
0 - 20 cm	0 (0)	4 (8)	8(32)	8(48)	7(56)	27(144)	86
20 - 40 cm	1 (1)	1 (2)	2 (8)	2(12)	0 (0)	6 (23)	14
Above 40cm	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0

Notes 1: There were no roots outside the 90 cm radius circle.

2: Within the range between the 70 cm radius circle and the 90 cm radius circle, only six roots were found at depths between 5 cm and 25 cm.

3: Within the range between the 50 cm radius circle and the 70 cm radius circle, roots were distributed at depths between 3 cm and 27 cm, with many of them being found at depths between 5 cm and 20 cm. The western side had most of the roots, followed by the eastern side and the southern side in that order. There were no roots in the northern side.

4: Within the range between the 30 cm radius circle and the 50 cm radius circle, roots were distributed at depths between 3 cm and 25 cm, with most of them being distributed at depths between 3 cm and 20 cm.

5: Within the 30 cm radius circle, most of the roots appeared when soil was removed to a depth of 20 cm. At a depth of 20 cm and under, only seven roots which had grown diagonally were found. The longest one was 45 cm long.

(2) Peaches

1) Test on Alkaline Soil Correction (1994 - 1995)

a. Purpose

There were more outbreaks of chlorosis in peach trees than in kiwi fruit trees, giving adverse effect on the growth of trees. A direct cause of the outbreaks of chlorosis was considered unbalanced absorption of certain kinds of soil ingredients, but soil analysis did not show insufficiency of specific ingredients. The results of leaf analysis, however, showed potassium and calcium contents were larger, while zinc and manganese contents were smaller, than usual.

Insufficient absorption of soil ingredients was attributable either to soil reaction being inclined to alkalinity or to antagonism caused by excessive absorption of potassium.

First, treatment was administered for the purpose of bringing soil reaction to acidity, and a test was conducted on whether the treatment contributed to the control of outbreaks of chlorosis or not.

b. Test Method

First, outbreaks of chlorosis were given values according to their degrees, as mentioned below, and the peach trees were classified according to these degrees.

0 ... Healthy tree without chlorosis
1 ... Tree having a few yellow leaves (about 30% of the leaves)
2 ... Tree with half of its leaves being yellow
3 ... Tree having many yellow leaves (about 80% of the leaves)
4 ... Tree whose leaves were yellow
5 ... Tree with a few white leaves caused by chlorosis among its yellow leaves
6 ... Tree whose leaves were mostly white
7 ... Tree with withered leaves among its white leaves

Then, 20 trees were selected from among the trees classified as Degree 5 or 6, and ten were subjected to treatment, and the others not subjected to treatment were used as a control.

A 1.7 m radius circle (about 9 m^2) was drawn around each of the ten trees, and 450 g of sulfur powder was sprinkled evenly over the surface of the ground within the circle (50 g per 1 m^2) and mixed with soil up to a depth of 2 cm to 3 cm below the ground surface.

Treatment on a trial basis was planned in the beginning of February 1994, but frequent rain made the ground muddy and prevented the administration of treatment. Treatment was carried out on March 4.

c. Test Results

In changing soil reaction by sulfur powder, a certain period of time

is needed until sulfur is oxidized and thereby works upon soil. This being the case, it was thought unreasonable to expect effect of the treatment on the growth of the peach trees in the year the treatment was administered. Degrees of chlorosis in the ten trees were, however, examined in the end of April and the end of September that year, for the purpose of ascertaining the conditions of chlorosis after the trial treatment. Regarding effect of the treatment on the growth in the following year, the conditions of the trees were examined in May and September of the following year. Table 2-5-24 shows the results.

Table 2-5-24 Effect of sulfur treatment of the peach field soil on chlorosis control (number of trees, 1994)

Degree of chlorosis	Treated								Not treated							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
Before treatment (Fall, 1993)	-	-	-	-	-	5	5	-	-	-	-	-	-	5	5	-
Year of treatment (Apr. 26, 1994)	1	-	4	1	2	2	-	-	-	1	4	1	-	-	2	2
(Sep. 29, 1994)	-	-	-	-	3	1	5	1	-	-	-	-	-	3	1	6
Following year of treatment (May 18, 1995)	-	-	-	1	1	1	4	3*	-	-	1	-	-	3	1	5*
(Sep. 20, 1995)	-	-	-	-	2	-	5	3*	-	-	-	-	1	1	2	6*

Note: A figure with an asterisk includes withered trees.

Among those trees which had been classified as Degrees 5 and 6 in the fall of the preceding year, chlorosis was found in a few trees in the survey carried out on April 26 of the following year, about one month after treatment, irrespective of the administration of treatment. The survey carried out on September 29 on effect of treatment during summer did not show effectiveness of it, as chlorosis was considerable in both classifications.

In 1995, the second year after treatment, adverse effect of stagnant ground water during the winter after the torrential downpour in November, 1994 was so considerable that some of the healthy trees were withered. In this situation, chlorosis broke out in early spring. The outbreak of it was considerable in May among the test trees, irrespective of the administration of treatment. It seemed that treatment was nullified. As sulfur treatment of soil did not yet prove to be effective by that time, it was not ascertained whether this treatment method was useful for the correction of soil reaction or not.

2) Analysis of Peach Leaves

a. Purpose

Leaf ingredients were analyzed, for the purpose of identifying causes which triggered outbreaks of chlorosis in the peach field.

b. Test Method

One hundred yellow leaves were collected from trees in which chlorosis break out in the beginning of June, 1993, and 100 healthy green leaves were collected for analysis.

Analysis of the leaves was entrusted to the Alata Institute of Horticulture,the Ministry of Agriculture, Forestry and Rural Affairs (MAFRA) of the Republic of Turkey. A comparison was made between the analysis results received from the Institute on July 1 of the same year and the results of analysis conducted by the Yalova Institute of Horticulture of MAFRA over a wide range of fruit trees grown in Turkey.

c. Test Results

Table 2-5-25 shows the results of analyses conducted by the Alata Institute of Horticulture and the Yalova Institute of Horticulture.

There seemed no problem in the contents of nitrogen, phosphorus, calcium and magnesium among five major elements. Potassium content in peach leaves in other orchards in Turkey accounted for 2.2% to 3.0%, while that in the green leaves of peach trees in the experiment field accounted for 4.37%, which was considerably high. The chlorosis leaves contained potassium accounting for as high as 4.91%. As too much absorption of potassium sometimes caused deficiency in the other elements due to antagonism, it was necessary to regard potassium as one of the problems which needed solution. There seemed no problem in copper, one of four micro elements. Contents of iron, zinc and manganese seemed smaller in the peach leaves of the experiment field than in other orchards in Turkey. There seemed deficiency in these three elements.

Table 2-5-25 Analysis of peach leaves (July 1, 1993)

	%					ppm			
	N	P	K	Ca	Mg	Fe	Zn	Mn	Cu
Chlorosis leaves	2.93	0.15	4.91	2.2	0.76	81.5	14.0	49.3	7.4
Green leaves	3.02	0.17	4.37	2.1	0.59	81.5	15.6	45.2	9.8
Random samples from Yalova Experiment Field (1982)									
(Smallest -	2.5	0.11	2.1	1.8	0.4	100	16	31	3.0
Largest)	2.9	0.15	3.0	2.7	0.7	230	45	160	16.0

3) Test on the Administration of Potassic Fertilizer in Large Quantities

a. Purpose

A test was conducted for the purpose of ascertaining whether chlorosis outbreaks in peaches were remotely connected with antagonism due to excessive absorption of potassium through soil or not.

b. Test Method

As in the test mentioned earlier, 20 peach trees were selected from

among those trees classified as Chlorosis Degrees 1 and 2, where the outbreak of chlorosis was not so considerable. Treatment was administered to ten of them, and the rest were used as a control.

On March 4, 400 g of potassium sulfate was administered to each of the ten trees. Potassium sulfate was sprinkled around the trees in a circular band between a diameter of 0.5 m and a diameter of 1.5 m on the surface of the ground, and then mixed with soil 2 cm to 3 cm below the ground surface.

Degrees of chlorosis were observed on April 26, one month after sprouting and on September 29, after the trees passed the summer. In the middle of July, analysis was made on soil within a 1 m radius circle with a tree as the center, with a sample from a depth of 30 cm, for the purpose of ascertaining the existence of potassium.

c. Test Results

Table 2-5-26 shows the results from the treated trees and the control trees.

As a result of having administered potassic fertilizer to the treatment section, it was true that potassium content was increased in the soil by July, but there were not more outbreaks of chlorosis in the treatment section than in the control section. In April, chlorosis was found in few trees in both the treatment section and the control section. In the end of September, about 80% of the leaves became yellow, which was classified as Degree 3.

Table 2-5-26 Administration of potassic fertilizer and degrees of chlorosis*

	Degree of chlorosis			
	October 1993	Apr. 26 1994	Sep. 29 1994	Potassium in soil as of July 1994 ppm
Treatment sec.	1.5 (1 - 2)	0.8 (0 - 2)	3.1 (1 - 5)	299.7 (237.7 - 371.3)
Control sec.	1.5 (1 - 2)	0.5 (0 - 2)	2.8 (1 - 6)	197.6 (190.0 - 212.2)

Note: *For the degrees of chlorosis, refer to Note 1 of Table 2-5-8.

The potassium contents obtained from analysis conducted in July by the Alata Institute of Horticulture, MAFRA were greatly different from those obtained from analysis conducted in January of the preceding year in Cukurova University. In analysis in Cukurova University, 790 ppm, 870 ppm and 900 ppm were the analysis results for three samples collected very near the point where samples were collected for analysis this time, from the same depth of 30 cm. This led to the conclusion that the potassium content was too large. The results in 1995, however, showed 237.7 ppm, 290.0 ppm and 371.3 ppm even in the treatment section, while they were 190.0 ppm, 190.0 ppm and 212.9 ppm in the control section. It was impossible for these potassium contents to cause antagonism due to excessive potassium, and causes of chlorosis had to be identified from a

different viewpoint.

4) Test on Leaf Sprinkling of Micro Elements (Part 1, 1993)

a. Purpose

As it appeared that chlorosis outbreaks in the peach orchard were caused directly by deficiency of some of ingredients (even if remote causes could not be identified), reaction of leaves was examined, alongside leaf analysis, by sprinkling leaves with micro ingredients whose existence was expected.

b. Test Method

Four ingredients of manganese, magnesium, zinc and iron were selected for the test, and a leaf sprinkling preparation of Turkish make were used. The preparation contained 4.2% of manganese and magnesium, respectively, 9.0% of zinc and 13.0% of iron.

In May 1993, eight rows in which the outbreak of chlorosis was considerable were selected from the 210 a (21 da) peach field. For testing one ingredient in two rows, the trees of a row were divided into two groups, namely, the treatment section and the control section. For one row, treatment was administered to every other tree.

Instructions on sprinkling concentration were followed, and 300 g of the preparation was solved in 100 liters of water. The preparation was sprinkled from a power spray to the extent that the leaves became sufficiently wet.

Sprinkling was begun on May 28, repeated five times every other week after that until July 8.

As in the case of the sulfur treatment test, values were given according to degrees of chlorosis. Outbreaks of chlorosis were observed in the end of May 1993 (before treatment) and after sprouting about one year after sprinkling.

c. Test Results

None of the trees in which the outbreak of chlorosis was considerable as of May showed reaction to the sprinkling of four ingredients five times, in their growth after sprinkling. Degrees of chlorosis were examined, therefore, in the spring of the following year, when current shoots grew to a certain extent, and compared with the conditions before sprinkling. The results are shown in Table 2-5-27.

In April 1994, chlorosis appeared to be decreased in both the treatment section and the control section, as compared with that in June 1993. The difference in chlorosis outbreaks between the sections, however, varied from ingredient to ingredient. A greater decrease of chlorosis outbreaks in the treatment section than in the control section showed the effectiveness of sprinkling, as a matter of course. With zinc, chlorosis outbreaks decreased by as much as 24.5%, followed by 9.5% with manganese. Chlorosis decreased only by 4.1% with iron. With magnesium, on

Table 2-5-27 Test results of leaf sprinkling (1993) (Comparison of degrees of chlorosis outbreaks)

	Manganese			Magnesium			Zinc			Iron		
	Before treatment (June 1993)	After treatment (Apr. 1994)	Comparison %	Before treatment (June 1993)	After treatment (Apr. 1994)	Comparison %	Before treatment (June 1993)	After treatment (Apr. 1994)	Comparison %	Before treatment (June 1993)	After treatment (Apr. 1994)	Comparison %
Treatment section	4.1	2.8	68.3	5.1	5.3	103.9	4.1	1.9	46.3	3.5	1.4	40.0
Control section	4.5	3.5	77.8	4.2	3.2	76.2	4.2	3.2	76.2	3.5	1.5	44.1
Decrease after sprinkling %			9.5			- 27.7			24.5			4.1

Notes: 1. For the degrees of chlorosis, refer to Note of Table 2-5-8 and numbers in the table are average of 10 trees.
2. Decrease of chlorosis after sprinkling % = Comparison of the conditions in the control section before and after sprinkling (%) - Comparison of the conditions in the treatment section before and after sprinkling (%)

the other hand, chlorosis increased by as high as 27.7%. These results showed that the current outbreaks of chlorosis were largely attributable to zinc and manganese. It seemed possible to control chlorosis outbreaks by sprinkling these two ingredients. The decrease with iron was too small to ascertain its effectiveness. Magnesium, which caused an increase of chlorosis, was not suitable for leaf sprinkling.

5) Test on Leaf Sprinkling of Micro Elements (Part 2, 1994)

a. Purpose

The examination of the results of leaf analysis and the leaf sprinkling test conducted in the preceding year made it clear that chlorosis outbreaks were attributable to the deficiency of zinc and manganese among the leaf ingredients. A test was conducted with those trees where chlorosis was considerable, by sprinkling zinc and manganese over their leaves, for the purpose of ascertaining whether the sprinkling of them contributed to the prevention of chlorosis outbreaks or not.

b. Test Method

A preparation for zinc sprinkling and a preparation for manganese sprinkling were selected from among the leaf sprinkling agents on the market in Turkey, and a mixture of these was used. Both preparations contained 4.2% of respective ingredients.

Ten trees which were classified as Degree 3, with about 50% of their leaves being yellow, and another ten trees which were classified as Degree 4, with about 80% of their leaves being yellow, were selected for the test. In each degree, five were sprinkled and the rest were used as a control.

Sprinkling was conducted under the concentration directed by the guideline attached to the preparation, and 125 ml of the preparation was used for 100 liters of water. It was administered from a power spray until the leaves of the trees became sufficiently wet.

Sprinkling was carried out seven times from May 9 until May 30, at intervals of three or four days.

Effectiveness of sprinkling was examined by analysis of leaf ingredients after sprinkling and the examination of the extent of decrease of chlorosis. Regarding leaf analysis, 100 leaves were collected at random on July 6 from three trees each in the treatment section and the control section, and analysis of them was entrusted to the Alata Institute of Horticulture, MAFRA.

c. Test Results

As in the test in the preceding year, there appeared no change in chlorosis outbreaks after sprinkling. Therefore, only the results of leaf ingredient analysis is shown in Table 2-5-28.

In the treatment section, the contents of zinc and manganese obviously increased. In the control section, zinc content was 7.8 ppm to 9.1 ppm,

which was considerably low, while that in the treatment section was 56.8 ppm to 66.3 ppm, which was higher than the average in Turkey. Manganese contents, on the other hand, were 110.0 ppm to 130.0 ppm even in the control section, which were ordinary values in Turkey. These were much larger than 49.3 ppm, the result of analysis of chlorosis leaves in the preceding year. In the treatment section, manganese contents were further larger, showing 190.0 ppm to 195.0 ppm. It was difficult to identify the reason that manganese contents were ordinary this year, while it had been apt to be insufficient in the preceding year. Further analysis seemed necessary in this respect.

It became clear that leaves absorbed the target ingredients, as a result of the leaf sprinkling of them. The effect, however, did not become apparent, as it had not appeared in the preceding year. It was necessary to examine the conditions in the following year concerning direct effect on chlorosis control. No tests were conducted on iron, which showed little effect to the decrease of chlorosis in the preceding year. Iron contents were, however, 63.5 ppm to 76.5 ppm, which were smaller than ordinary contents of 100 ppm to 200 ppm in soils of Turkey, and it would be necessary to conduct a test also on iron.

Table 2-5-28 Ingredients content in peach leaves after the leaf sprinkling of zinc and manganese (July 6, 1994)

	%					ppm			
	N	P	K	Ca	Mg	Fe	Zn	Mn	Cu
Treatment section	2.90	0.12	3.5	5.2	0.74	70.0	66.3	190.0	15.0
	2.88	0.11	2.6	4.2	1.01	70.0	56.8	190.0	15.0
	2.74	0.13	4.1	4.3	0.86	63.5	56.8	195.0	10.0
Control section	2.92	0.09	3.4	2.1	0.73	63.5	9.1	130.0	20.0
	2.78	0.10	3.5	3.7	0.76	76.2	8.6	110.0	17.0
	2.90	0.11	3.9	5.5	0.94	63.5	7.8	102.5	20.0
Ordinary content in soils of Turkey									
(Smallest	2.5	0.11	2.1	1.8	0.4	100	16	31	3
largest)	2.9	0.15	3.0	2.7	0.7	230	45	160	16

6) Test on Leaf Sprinkling of Micro Elements (Part 3, 1995)

a. Purpose

As iron sprinkling proved necessary in the test in the previous year, iron was included in the micro elements for leaf sprinkling this year.

b. Test Method

The following agents were used in the test.

Iron.....Fe-EDTA (Ferric Monosodium Ethylene Diamin Tetra Acetate)
Manganese..Manganese sulfate, a manganic leaf sprinkling agent on the market in Turkey
Zinc.....Zinc sulfate, a zincic leaf sprinkling agent on the market in Turkey

Treatment sections and details of treatment were set as follows.

1 Fe Section
Administration of 0.1% Fe-EDTA aqueous solution
2 Fe + Mn + Zn Section
Administration of 0.1% Fe-EDTA, 0.2% manganese sulfate, and 0.3% zinc sulfate, together with 0.3% unslaked lime
3 Fe + Mn(T) + Zn(T) Section
Administration of 0.1% Fe-EDTA, and zinc and manganese contained in leaf sprinkling agents obtained in the Turkish market
4 Mn Section
Administration of 0.2% manganese sulfate, together with 0.3% unslaked lime

Four trees were used for the test in each section, namely, two trees from among the trees in which chlorosis of Degree 2 appeared and two from among those in which chlorosis of Degree 3 appeared. Fe-EDTA was not mixed with other agents. In Sections 2 and 3, Mn and Zn were sprinkled on different dates from those of Fe sprinkling. Fe-EDTA was sprinkled five times (May 22 to June 19) at intervals of one week, while Mn and Zn were sprinkled three times (May 23 to June 12) at intervals of ten days. A small power spray was used for sprinkling. Agents were sprayed until they began dripping from leaves. These agents were sprinkled in the morning, when temperatures were 32℃ to 35℃. They dried in ten minutes, and there were no rains during the test period.

c. Test Results

The degrees of chlorosis tended to lower slightly in tips of newly developing branches about ten days after sprinkling in the Fe Section. Reactions to sprinkling, however, hardly began to appear in the other sections. Additional one week later, leaves began greening, which could be regarded as an effect of sprinkling, in the two sections where Fe, Mn and Zn were sprayed. Greening was, however, found only in newly developing leaves, and there was no change in chlorosis already found in the trees.

Table 2-5-29 shows a general view of the results in the trees on the whole on August 9, about two months after sprinkling.

Although leaf chlorosis tended to show advanced stages with the lapse of time from early spring, its degrees slightly lowered in the sprinkling sections except for the Mn Section. Effects of sprinkling were greatest in the Fe-EDTA Section, where Fe-EDTA was sprayed singly. In the sections where Fe-EDTA, zinc and manganese were sprayed, less effect resulted, contrary to expectation. It seemed that the coexistence of these three substances produced an antagonistic reaction in leaves, impeding their absorbing these substances. There was no significant difference in effect among zinc sulfate, manganese sulfate, and the zincic and manganese agents obtained in the market. There was no difference between the Mn Section where manganese sulfate was sprinkled singly and the No-treatment section, with no effect resulting from sprinkling. In the test this year, after all, Fe sprinkling proved slightly effective for controlling chlorosis

Table 2-5-29 Test results of leaf sprinkling for peaches(1995)

Section	Degree of chlorosis before sprinkling	Degree of chlorosis on August 9	Results
Fe-EDTA	2.50	1.25	The number of green leaves slightly increased, but their tips changed into yellow.
Fe-EDTA+Zn+Mn	2.00	1.75	A fewer green leaves developed, and effects of sprinkling seemed smaller than in the Fe-EDTA Section.
Fe-EDTA+Zn(T)+Mn(T)	2.50	2.25	Much the same as in the Fe-EDTA+Zn+Mn Section.
Mn	2.00	2.60	No effects were found.
No treatment	2.50	2.75	Trees had deep yellow leaves, which were hardly capable of photosynthesis.

Notes 1: Sprinkling was carried out between May 22 and June 19.
2: For the degrees of chlorosis, refer to Note of Table 2-5-8.

outbreaks.

Chlorosis outbreaks were controlled, seemingly as a result of sprinkling, only in leaves which developed after sprinkling. Trees recovered green leaves, but they did not live long. Chlorosis leaves began appearing in about one month after sprinkling.

It had been concluded, in the leaf analysis conducted in the previous year, that chlorosis appeared in those leaves whose zinc and iron contents were small. The test this year revealed that chlorosis outbreaks were caused by iron deficiency. Regarding zinc, however, the sprinkling of a combination of zinc and iron did not prove effective. It was not ascertained whether zinc deficiency was a cause of chlorosis outbreaks or not.

The test results show the effectiveness of the leaf sprinkling of Fe-EDTA as an emergency measure for chlorosis control. To be continuously effective, sprinkling needs to be repeated at intervals of at least one month.

7) Test on Bagging Cultivation (1994)

a. Purpose

Although Turkish people did not practice bagging cultivation of fruits, bagging cultivation was tested, with a view to protecting fruit from intensive summer sunlight (which sometimes caused sunburn on fruit) and thereby improving fruit quality and protecting it from insects and diseases.

b. Test Method

In the beginning of May, about one month after the flowering of Early Red and Dixi Red peaches, fruit thinning was carried out for these varieties, so that those peaches fruiting downward would be left on fruit-bearing branches. A test was conducted on trees for which fruit thinning was finished. In both varieties, bagging was carried out in rows where degrees of chlorosis were considered low. Bagging was carried out for 33 Early Red trees in the third and the fifth rows, and to 27 Dixi Red trees in the fortieth, the forty-second, and the forty-fourth rows.

Bags used were those made in Japan for peach bagging, with their inside being painted black. Four thousand nine hundred bags were used. The rows other than the above-mentioned rows were used as a control.

After bagging, the bags were not removed until harvesting time, and results were examined after harvest.

c. Test Results

Table 2-5-30 shows the results of peaches harvested in the middle of June.

Table 2-5-30 Test results on bagging cultivation of peaches (1994)

Variety	Bagged or not	Date of harvest	Fruit Weight g	Long. dia. cm	Trans. dia.I cm	Trans. dia.II cm	Sugar content Brix	Acidity %
Dixi Red	No bag	June 16	177.2	7.2	6.8	6.9	14.0	1.65
	Bagged	June 20	216.4	7.8	7.8	7.9	12.8	1.60
Early Red	No bag	June 16	136.6	6.4	5.9	6.2	13.3	1.73
	Bagged	June 20	164.4	7.1	7.2	7.4	12.4	1.58

Bagged peaches of both varieties were fattened well. In Early Red, the average weight of peaches not bagged was 136.6 g, while that of bagged ones was 164.4 g, being heavier by 20%. In Dixi Red, the average weight of peaches not bagged was 177.2 g, while that of bagged ones was 216.4 g, being heavier by 22%. Bagged peaches became fatter also in Japan, but not at such high rates. These high rates of fattening seemed to result from abundant sunshine in Turkey.

Bagging lowered sugar content of both varieties. In Early Red, peaches not bagged showed 13.3 Brix, while bagged ones showed 12.4 Brix, being decreased by 6.8%. In Dixi Red, peaches not bagged showed 14.0 Brix, while bagged ones showed 12.8 Brix, being decreased by 8.6%. It was, however, satisfactory in sweetness for early-maturing varieties to have a sugar content exceeding 12 Brix. Acidity declined slightly. In Early Red, it declined from 1.73% to 1.58%, being decreased by 8.6%, while in Dixi Red it declined from 1.65% to 1.60%, being decreased by 3.0%. This decrease, however, hardly affected edible quality of these varieties, and peaches tasted considerably sour. It was impossible to make eating quality of yellow-flesh peaches comparable with that of white-flesh peaches.

Regarding appearance of peaches, their skin color was maintained, showing beautiful yellow. Coloring did not take place because the bags

were not removed until harvest. On the other hand, peaches without bags were colored considerably by intensive sunlight, and many changed into dark red rather than red. In peaches whose skin was dark red, flesh was also red.

Regarding disease and pest control effect, no injuries were caused in both bagged and not-bagged peaches, because neither diseases broke out nor harmful insects bred during the test period.

After all, positive effects of bagging cultivation were recognized in the fattening of peaches and improved appearance, while negative effect included a decrease of sugar content. The decrease in acidity was too slight to be regarded as positive effect.

In the similar test conducted in 1993 on a small-scale basis, the results were much the same, except for the time of harvest being late by 10 days.

8) Test on Extents of Fruit Thinning (1994, 1995)

a. Purpose

In peach growing in Turkey, little importance seemed to be given to fruit thinning. Peaches on the market were generally small. A test was conducted for the purpose of obtaining data on proper fruit thinning for harvesting peaches of satisfactory size.

b. Test Method

Well-grown trees were selected as samples, and fruit-bearing branches of moderate force of these trees were selected. A test was planned with varied extents of fruit thinning on these branches in 1994 and 1995. Conditions of flowering and fruit bearing in spring were, however, not uniform in these branches in both years, and the test was canceled because there were no fruit-bearing branches suitable for the test.

9) Trial Marketing (1994, 1995)

a. Purpose

Trial marketing was carried out, for the purpose of ascertaining what evaluation was given in local markets to peaches harvested in the experiment field.

b. Test Method

(a) 1994

The harvested peaches were carried to a cool place and left there for four or five hours. Then they were divided into two groups, namely, the group of larger ones and the group of smaller ones, with 100 g being the border line, packed in wooden flats one by one (a flat had a capacity of about 10 kg), and shipped. The flat was 55 cm wide, 41 cm long and 9 cm

deep, used commonly for fruits and vegetables.

"TIGEM" in the column of destination in Table 2-5-31 refers to peaches sold to officials of the Cukurova Farm under the control of the General Directorate of National Farms. These shipments were mentioned in the table for the reader's reference, as their prices were approximately the market prices at that time.

(b) 1995

As it took time in the previous year to cool the harvested peaches in the normal room temperature, without producing satisfactory result, a cooling chamber was prepared this year on a trial basis, where the harvested peaches were cooled for about two hours. Then the peaches were packed and shipped in the same wooden flats as used in the previous year.

c. Test Result

(a) 1994

Table 2-5-31 shows shipments and prices.

Table 2-5-31 Results of peach marketing (Early Red and Dixi Red, 1994)

Date of selling	Classification	Quantity kg	Unit price TL/kg	Destination
June 17	Large	135	7,000	Adana Market
	Small	114	5,000	Adana Market
June 20	Large	126	8,000	Adana Market
	Small	110	5,000	Adana Market
	Mixture of L&S	150	7,500	TIGEM
June 21	Large	130	8,500	Adana Market
	Large, bagged*	98	8,000	Adana Market
	Small	70	5,000	Adana Market
June 22	Large	107	8,000	Adana Market
June 24	Large	179	8,000	Adana Market
	Small	8	5,000	Adana Market
June 25	Large	151	7,000	Adana Market
	Small	47	5,000	Adana Market
June 25	Large	116	8,000	TIGEM
June 28	Large	400	7,000	TIGEM

Note: "Bagged" means peaches produced by bagging cultivation.
Exchange rate on June 15, 1994: $1 = TL 31,975

Unit prices were almost unchanged from June 17 through June 25, during which peaches were shipped. The unit price of large peaches was between TL 7,000 and TL 8,500/kg, while that of small peaches was TL 5,000. Peaches were sold in retail stores at prices between TL 10,000 and TL 12,000/kg, which seemed reasonable.

The unit price of those peaches which were bagged until harvest was TL 8,000/kg, TL 500 lower than that of peaches without bags (TL 8,500). It seemed that this resulted from the fact that bagged peaches had been hardly colored, although they were of the same size as, or larger than, non-bagged peaches. This pricing seemed to be a result of precautions against those

peaches which people had not seen before. In view of the fact that there was a request for more shipments of bagged peaches after the first shipment, proper evaluation did not seem to be given until the second shipment. It seemed difficult, however, to try to raise unit prices of peaches through bagging cultivation.

(b) 1995

Regarding the first shipment of peaches, which had been cooled in the cooling chamber, to the Adana Market, it was pointed out that water drops adhering to the surfaces of peaches as a result of seemingly excessive cooling tended to shorten the life of them. Pre-cooling in the cooling chamber was therefore discontinued.

The peaches were divided into two classes in the previous year, namely, the large class and the small class, but this year peaches were not classified, as they were comparatively even in size.

Table 2-5-32 shows the result of shipments this year.

Table 2-5-32 Results of peach marketing (Early Red and Dixi Red, 1995)

Date of shipment	Quantity kg	Unit price TL	Market	Remarks
June 8	428	13,333	Adana	Shipped after pre-cooling
June 13	568	14,814	Adana	Shipped after cooling in normal temperature
June 20	513	13,889	Adana	Same as above

Note: Exchange rate on June 16, 1995: $1 = TL 43,006

The unit market price in dollar was as follows.

1994:	Large peaches	$0.22 - $0.27/kg
	Small peaches	$0.16/kg
1995:		$0.31 - $0.34/kg

Peach prices were higher in 1995 by 40% in low price and by 25% in high price. It seemed that peaches were shipped in such small quantities in 1994 that pricing them was difficult. Low prices for the first shipments in 1995, which should have been priced high, seemed to be attributable to water drops on the surfaces of peaches which had been excessively cooled in the pre-cooling chamber. Excessive measures do not seem to produce good results.

10) Test on Iron Agent Infusion to the Trunks of Chlorosis Peaches (1995)

a. Purpose

A test was conducted for the purpose of ascertaining the effectiveness of trunk infusion of insufficient substance, as an emergency measure for controlling leaf chlorosis.

b. Test Method

Ferric ammonium citrate, an iron chelate, was used for testing. A 5 mm diameter hole was drilled on the trunk to a depth of 10 mm, and the hole was filled with chelate iron and sealed with wax. One hole was made on either side of the base of the main branch. Six holes were therefore made in a tree having three main branches, while eight holes were made in a tree having a sub-main branch in the proximity of the main branches. Four trees were selected each from among the trees of Chlorosis Degrees 2 and 3.

c. Test Results

In the test section, leaves at the branch base began falling on the second day after treatment, seemingly due to damage from the chelate iron, and continued to fall until the fourth day. The falling of leaves was, however, not so serious. After that, branches newly developed green leaves. Still, leaves were green only for about a month, and then changed into yellow. It was ascertained that effects of trunk infusion for chlorosis control lasted for about one month.

Trunk infusion was effective right above the hole. Where there was a sub-main branch right above the hole, trunk infusion was effective for the sub-main branch, without exerting effect on the portion right above the sub-main branch.

The holes filled with chelate iron were sealed with wax. Some trunks exuded resin from under the wax. The fact that peach trees did not form calluses easily proved to be a problem.

In June, the same test was conducted on peach trees and pear trees of Japanese varieties, with a view to reproducing the effectiveness of trunk infusion. The test showed the same progress: although chlorosis outbreaks were controlled in one week after the filling of chelate iron, the effect did not last long, and chlorosis leaves began appearing in three or four weeks, in the same manner as before trunk infusion.

It is true that trunk infusion can be an emergency measure for controlling chlorosis outbreaks in peaches, but it is difficult to conclude that this measure is good for the health of trees. As treatment needs to be administered at intervals of about one month, as in the case of leaf sprinkling, it is necessary to ascertain the conditions and impact of the hole on the tree in the lapse of time.

ii) Experimental Administration of Iron Agent to Peach Field (1995 -)

a. Purpose

For chlorosis control in the peach field, the leaf sprinkling and trunk infusion of chelate iron proved effective. As satisfactory results were not obtained from these, a test was conducted for seeking a better measure.

b. Test Method

The following three kinds of agents were used.

① Feramin (chelate iron of Turkish make, with Fe content accounting for 7.2%)
② Chelate iron for fertilizer (EDTA-FeNa of Japanese make, with water-soluble iron content accounting for 13%)
③ Ferrous sulfate (made in Turkey)
④ Sequestrene (Sequestrene 138 Fe, chelate iron of Turkish make, with Fe content accounting for 6%)

Soil treatment was administered to those rows of trees where the degree of chlorosis was lower and those rows of trees where the degree of chlorosis was higher. Treatment sections were decided as follows.

Table 2-5-33 Treatment sections of administration

Agent name	Section	Quantity per tree (g)			No. of trees
		Beg. of dormancy	End of dormancy	Total	
Feramin	A	300	-	300	20
	B	300	300	600	20
	C	600	-	600	20
	D	600	600	1,200	20
Chelate iron	E	150	-	150	20
	F	150	150	300	20
	G	300	-	300	20
	H	300	300	600	20
Ferrous sulfate	I	1,000	-	1,000	16
Sequestrene	J	-	600	600	46

A 40 cm wide and 40 cm deep ditch was dug between a 1.1 m radius circle and a 1.5 m radius circle around a tree, on the assumption that this portion was beyond the root range of the tree. The prescribed Fe agent was mixed sufficiently with well decomposed compost, and buried in the ditch. For sufficient mixing, the Fe agent was solved in about 30 liters of water, and then the solution was poured on compost and soil for mixing.

With ferrous sulfate and Sequestrene, treatment was administered for reference.

Treatment was administered in November 1995, the beginning of dormancy, and in March 1996, the end of dormancy.

c. Test Results

A study is conducted when treatment results are produced after sprouting in the spring of 1996.

12) Survey on Peach Roots (1995)

a. Purpose

Among those peach trees which had been healthy in the previous year, some were withered, seemingly because of root suffocation caused by stagnant ground water after the torrential downpour in November 1994. These dead trees were used to identify the distribution of roots in the viscous soil of the experiment field.

b. Test Method

Among those trees which hardly grew because of little sprouting in the spring of 1995, a tree showing a growth of more than 1 m in one-year-old branches at the tips of main branches (tree which was considered to have been healthy until the previous year) was selected for the survey. The tree was a five-year-old Dixi Red tree with a branch spread of 3.0 m long and wide, a height of 3.1 m and a girth of 37.0 cm.

First, a 150 cm radius circle was drawn on the ground around the tree (this circle was almost the same as the perimeter of the crown). The ground was carefully dug vertically along the circle, and the roots found there were dug up and counted according to thickness classifications. Root thicknesses were classified into six degrees, according to diameters of cut ends at the vertically dug section. Root thicknesses were classified into 1mm or less, 1 - 2 mm, 2 - 4 mm, 4 - 8 mm, 8 - 12 mm, and 12 mm or more. The depths of the roots on the vertically dug section were also observed. Regarding the two thickest roots, the distances and the depths to their tips were measured.

Then, the ground was dug within the range between a 120 cm radius circle and a 150 cm radius circle, within the range between a 90 cm radius circle and a 120 cm radius circle, within the range between a 60 cm radius circle and a 90 cm radius circle, and within the range of a 60 cm radius circle in that order for surveying. For the range within the 60 cm radius circle, roots were surveyed at intervals of a depth of 20 cm.

Table 2-5-34 shows the survey results.

Most of the roots which appeared on the 150 cm radius section were distributed between depths of 30 cm and 50 cm. One root 4 mm thick was found at a depth of 70 cm, while no deeper roots were found.

The thickest root was 98 cm deep, and reached a distance of 4.87 m from the tree. The second thickest root was 4.90 m long and 45 cm deep.

Within the range between the 120 cm radius circle and the 150 cm radius circle, most roots were 20 cm to 60 cm deep, and one was 3 mm thick at a depth of 75 cm. The longest one reached a distance of 102 cm.

Within the range between the 90 cm radius circle and the 120 cm radius circle, most roots were 15 cm to 65 cm deep. One root reached a depth of 86 cm.

Within the range between the 60 cm radius circle and the 90 cm radius circle, most roots were 15 cm to 75 cm deep. The longest one reached a depth of 82 cm.

In the range within the 60 cm radius circle, there were active fine roots 20 cm to 80 cm deep. The longest one reached a depth of 92 cm.

Although the roots were distributed in almost all directions, the

Table 2-5-34 Results of root surveying (May 1995)
(five-year-old Dixi Red tree)

Distance from the tree	No. of roots in each classification					
	1mm or less	1-2mm	2-4mm	4-8mm	8-12mm	12mm or more
150cm or more	27	19	27	8	11	12
120 - 150cm	90	74	32	19	9	11
90 - 120cm	66	35	26	7	8	10
60 - 90cm	59	43	13	5	9	11
60cm or less	102	58	50	28	18	24
Breakdown of "60cm or less"						
0 - 20cm depth	0	5	13	4	5	21 **
20 - 40cm depth	8	13	11	14	10	3
40 - 60cm depth	15	10	18	10	3	0
60 - 80cm depth	64	22	8	0	0	0
80cm or more depth	15	8	0	0	0	0

Note: 1. (*) Thicknesses are diameters of roots at places nearest to their bases in each classification.
2. (**) Classifications of 21 roots by thickness:

80 mm thick	1
60 mm thick	2
40 mm thick	1
30 mm thick	5
20 mm thick	4
12 mm thick	8

largest number of roots were distributed on the north side of the tree. Numbers of roots became smaller on the west side, on the east side, and on the south side in that order. This tendency, being the same as that in kiwi fruit trees, seemed to be attributable to the intensity of sunlight on the surface of the ground. That is, roots seemed to have been attracted to lower temperatures to avoid heat while the tree was too young to provide its roots with sufficient shade to protect them from intense sunshine.

Findings from the survey were as follows. Horizontal distributions of roots were mostly within the range of the 1.5 m radius circle, which was the same as the perimeter of the crown, while vertical distributions were mostly between depths of 20 cm and 80 cm. Where conditions were comparatively favorable, the tree was capable of extending its roots to a distance of 5 m and up to a depth of about 1 m from its base.

The sudden withering of peach trees in the spring of 1995 seemed to be caused by the suffocation of roots. More specifically, roots distributed in this manner were immersed in stagnant ground water after the torrential downpour in November 1994, before they became dormant in winter, and suffocated to death. Roots would have been a little more resistant and survived, if ground water had become stagnant a little later, after the resting stage of roots had begun.

(3) Plums

1) Test for Preventing Early Abscission (1994)

a. Purpose

In 1993, Can plum leaves began falling in the middle of August, and leaves which had grown up from spring and become mature were mostly lost by the end of September. Can trees only had leaves which began developing in the fall. A test was conducted for preventing the early falling of leaves.

b. Test Method

As the pathogenic fungus parasitic on the backs of leaves was identified as Tranzschelia discolor, Mancozeb (which contained the same ingredients as Zimandithane of Japanese produce), which was said to be effective to it, was sprinkled on the leaves in early summer. This was done for the purpose of preventing both outbreaks of rust and early abscission.

The concentration of the agent and the frequency of sprinkling were as follows.

A 1/500 Rhonazeb solution (Rhonazeb: trade name, with Mancozeb content accounting for 80%) sprinkled on June 23 and July 13.

The agent was sprinkled from a speed sprayer until the leaves became sufficiently wet.

Analysis was made in the end of August regarding rust, and analysis was made in the end of September regarding early abscission. Degrees of the generation of rust pustules on the backs of leaves and degrees of abscission were expressed in numbers of "+" marks.

One mark shows slight generation, while five marks refers to the most serious case.

c. Test Results

Table 2-5-35 shows the consequence of sprinkling.

Table 2-5-35 Effects of sprinkling on the control of rust and early abscission

Section	Rust generation	Occurrence of early abscission
Sprinkled section	++	++
No-sprinkling section	++++	++++

As a result of the sprinkling of a 1/500 Rhonazeb solution (Mancozeb accounting for 80%) twice in June and July, rust generation on Can leaves was reduced by half, while rust was found in 80% of the leaves in the no-sprinkling section. The decrease in occurrences of early abscission was almost the same, as if showing correlation between rust and early abscission. From this, it was concluded that early abscission was caused by rust.

The fact that sprinkling the agent twice could not control rust entirely seems to be attributable to the first sprinkling which was carried out a little too late. It is necessary to study the proper timing of sprinkling.

2) Trial Marketing (1994 - 1995)

a. Purpose

Trial marketing was conducted for the purpose of ascertaining what evaluation was given in the market to those plums produced in the experiment field.

b. Test Method

(a) 1994

Papaz and Formosa plums were harvested during ordinary maturing periods and shipped to the market, while Can plums were shipped both earlier than their maturing time and during their ordinary maturing time, in conformity with Turkish marketing practice. Those plums which had been injured by hailstorms or which were cracked were removed from the harvested plums. About 10 kg of plums were placed in a flat in bulk (as in the case of peach shipments) and shipped. As the plums were almost the same in size, sorting according to size was not carried out. The plums were shipped to Adana.

(b) 1995

Can plums were shipped successively six or seven weeks earlier than the maturing time until the maturing time came, with a view to obtaining information about unit prices for shipments in different time. Regarding Papaz, ripened plums were harvested and shipped. These two varieties were shipped to Adana.

Regarding Formosa, some plums were sorted into four grades according to size and shipped to Istanbul, and the others were sorted into two grades and shipped to Ankara.

They were placed in flats in the same manner as in the previous year.

c. Test Results

(a) Table 2-5-36 shows quantities and prices of plums harvested in 1994 and marketed on a trial basis.

Early-picked Can plums, which were sour and not soft enough, were sold at TL 11,000/kg in the Adana Market, while Can plums picked 15 days later (in maturing time) were sold at TL 7,000. The price of early-picked ones was higher by 56.8% than that of those picked in their maturing time.

On May 30, a plum weighed 18.8 g on the average, which was 87.0% of the average weight of 21.6 g on June 13 in the maturing time. Early-picked Can plums, which were lighter by 13%, were sold at a 57% higher price. This showed early-picked Can plums were much more payable than ripe ones.

Rather overripe Can plums shipped on June 17 were sold at only

Table 2-5-36 Result of plum marketing (1994)

Date	Variety	Quantity sold kg	Price TL/kg	Destination
May 30	Can(early)	350	11,000	Adana
June 14	Can(middle)	300	7,000	Adana
June 17	Can(late)	35	3,000	Adana
June 22	Papaz	39	4,000	Adana
June 22	Formosa	26	6,000	Adana

Note: The rate of exchange as of June 15, 1994:
$1 = TL 31,975

TL 3,000, proving that Can plums should be shipped earlier.

Papaz plums, which were shipped on June 22, were sold at as low as TL 4,000. These Papaz plums, which were almost the same in size as Can plums, did not seem to be priced high at this period of time which was late for the shipment of Papaz plums.

Formosa plums, which were shipped also on June 22, were sold at TL 6,000. This was not a satisfying price for the Formosa plums which were large enough and had a good appearance. It seemed that only one shipment did not produce proper evaluation, or that high-grade fruits were not priced so high in the Adana Market. It proved necessary to increase Formosa plum harvests and ship them successively to different markets.

(b) Table 2-5-37 shows the results of shipments of plum harvests in 1995.

The price of Can plums reached a peak on May 2, and declined gradually. The decline was gentle until May 24, but became sharp after that.

Plums were not fat enough on May 2, and one plum weighed only 7.2 g on the average. They were, however, fattened rapidly after that, weighing 18.9 g on May 17 and 22.6 g on June 17. The following relationship was identified between increased yields due to the fattening of plums and gradually declined selling prices. Assuming that plum weight was 100 on June 17, the maturing time, it was 84 on May 17 and 32 on May 2. Assuming that the unit selling price was 100 on June 17, it was 228 on May 17 and 257 on May 2. On May 2, the plum weight was less than one third of that in the maturing time, while the unit selling price was more than 2.5 times. On May 17, the plum weight was 84% of that in the maturing time, while the unit selling price was 2.28 times. After all, when increased yields due to increased weights of plums and the unit selling price were taken into account, plums were most profitable on May 17. As of May 2, plums were so small that consequent small yields did not produce large proceeds, despite high selling prices. For 10days from May 15 through 24, unit selling prices were high almost constantly, and plums shipped during this period were most profitable. For plums shipped after that, the sales declined because increased yields could not compensate for declining selling prices. In the previous year, too, it was profitable to ship plums half a month before the maturing time. With all these being taken into account, it can be concluded that Can plums should be shipped one month to half a month before the maturing time. (The unit selling price of TL 11,000 for the early-picked Can plum shipments in the previous year was

Table 2-5-37 Results of plum marketing (1995)

Date		Variety	Quantity sold kg	Price TL/kg	Destination	Average of fruit weight g
May	2	Can	309	16,667	Adana	7.2
	3	Can	170	16,667	Adana	
	4	Can	730	12,500	Adana	
	8	Can	120	12,500	Adana	
	15	Can	255	14,814	Adana	
	17	Can	135	14,814	Adana	18.9
	24	Can	350	15,741	Adana	
	25	Can	390	12,500	Adana	
June	8	Can	60	10,000	Adana	
	9	Can	515	8,333	Adana	
	12	Can	495	8,333	Adana	
	17	Can	523	6,481	Adana	22.6
	21	Can	528	4,630	Adana	
June	14	Papaz	828	8,333	Adana	
	15	Papaz	534	8,333	Adana	
	17	Papaz	1,050	7,407	Adana	
	19	Papaz	466	5,833	Adana	
	20	Papaz	554	5,555	Adana	
	22	Papaz	515	3,703	Adana	
June	23	Formosa	87	30,000	Ankara	
	23	Formosa	215	20,000	Ankara	
	24	Formosa	30	30,000	Istanbul	
	24	Formosa	21	20,000	Istanbul	
	24	Formosa	32	15,000	Istanbul	
	24	Formosa	230	10,000	Istanbul	

Note: The rate of exchange as of June 16, 1995:
$1 = TL 43,006

equivalent approximately to 34 cent, and that of TL 14,814 for the plums shipped on May 17 this year was equivalent approximately to 34 cent, which were just the same. The unit selling price of TL 7,000 for the ripe plums in the previous year was equivalent approximately to 22 cent, while that of TL 6,914 for the ripe plums this year was equivalent approximately to 16 cent, which was a slight decline.)

Papaz plums were shipped during the maturing time, but the unit selling price was higher for early-picked ones, as in the case of Can plums. In nine days, it declined to less than half the unit selling price on the day of the first shipment. Even for the first shipment, the unit selling price was TL 8,333, which was unsatisfactory and much the same as that of Can plums shipped during the maturing time. Turkish people might prefer early-picked ones also in the case of Papaz plums. (The unit selling price of TL 4,000 in the previous year was equivalent approximately to 13 cent, while the average unit selling price of TL 6,797 this year was equivalent approximately to 16 cent, which was a slight rise.)

As the unit selling price of Formosa was not satisfactory in the previous year in the Adana Market, plums of this variety were shipped to Ankara and Istanbul this year, and more reasonable prices were given, as expected. The Formosa plums for Ankara were classified into two grades, while those for Istanbul were sorted into four grades. Unit selling prices given to the shipments to Ankara were TL 30,000 and TL 20,000, and those

to the shipments to Istanbul were TL 30,000, TL 20,000, TL 15,000 and TL 10,000. The largest plums were priced at TL 30,000, and the second largest ones were given a unit selling price of TL 20,000 in both Ankara and Istanbul. For another two lower grades in the shipments to Istanbul, lower unit prices seemed to be given according to size. Too fine grading seemed to allow lower pricing. Although there would be no significant difference in the rating of grades between in Ankara and in Istanbul, a great difference resulted in the sales. The shipment of 302 kg to Ankara produced earnings of TL 6,910,000, while that of 313 kg to Istanbul produced earnings of only TL 4,100,000, because of a large quantity of plums rated as the lowest (i.e., smallest) grade. Apart from this, it seemed that higher prices were given to Formosa plums, whose quality was good, when shipped to Ankara and Istanbul than when shipped to Adana. (TL 6,000 was equivalent approximately to 19 cent in the previous year, while TL 30,000 was equivalent approximately to 70 cent. TL 17,902, the average unit selling price of this year, was equivalent approximately to 41 cent, being more than twice the average unit selling price in the previous year.) It must be taken into account that shipping to distant markets such as Ankara and Istanbul needs larger transportation expenses than shipping to the Adana Market.

2-5-3. Demonstration Fruits Field

(1) Purpose

The Adana district, which was regarded as a typical region of Anatolia, the Republic of Turkey, was chosen for preparing a demonstration fruits field. Varieties of several species introduced from Japan and Turkish varieties were grown there on a trial basis, for the purpose of identifying those varieties which suited Turkish people's taste and whose commercial production was feasible.

(2) Test Method

1) Fruits for Testing

The following species and varieties were planted first. "(T)" refers to a Turkish variety.

Fig	Kadota, Masui Dauphine
Loquat	Tanaka, Mogi, Yuvarlak Cukur Gobek (T), Akko XII (T)
Pomegranate	Ruby King, Wonderful, Cekirdeksiz (T), Hicaz (T)
Chestnut	Tsukuba, Tanzawa
Persimmon	Fuyuu, Nishimura Wase, Saefuji, Hiratanenashi, Matsumoto Wase Fuyuu, Izu
Cherry	Satohnishiki, Takasago
Apricot	Niigata Ohmi, Heiwa
Plum	Can (T), Inoue, Sir Prise, Santa Rosa, Sugar, Oh-ishi Nakate, Taiyoh
Nectarine	Hiratsuka Red, Imai Nekutarin, Shuuhoh, Maygrand,

	Arm King
Peach	Yamafuji Hakuhoh, Takei Wase Hakuhoh, Kawanakajima Hakutoh, Akatsuki, Kurakata Wase
Grape	Kaiji, Kyohoh
Pear	Shinsei, Nijisseiki, Hohsui, Kohsui, Shinsui, Tama
Apple	Fuji, Tsugaru, Stark Earliest (T), Anna (T)

After the first planting, vacancies caused by dead trees were filled, and other varieties than those mentioned above were identified among the planted seedlings. These were also used for testing. Additional varieties were as follows.

Loquat	Nagasaki Wase
Persimmon	Saijoh, Ohtanenashi, Isahaya, Kohshuu Hyakume, Mikado
Peach	Sunago Wase, Hakuhoh, Ohkubo
Grape	Hokkoh
Pear	Osa Nijisseiki

2) Experiment Sections

a. Experiment Field

The experiment field was a rectangular field extending north and south, adjacent to the demonstration field on the east. The field had an area of 1.8 ha (313 m x 58 m).

b. Planting Intervals

Apples were planted at intervals of 6 m x 2 m, for dwarfing, and the other varieties were planted at intervals of 6 m x 3 m.

c. Variety Arrangement

Each variety was planted in a row extending east and west. Fig. 2-5-9 shows variety arrangement.

3) Irrigation Method

The same method as in the verification test was employed.

4) Planting Methods

Planting was carried out in February 1990 in the same manner as in the verification test.

Apples were planted in a hedge with dwarfed main branches. Pears were planted in two-step horizontal cordon type hedge. Grapes were trained in two horizontal steps, in a similar manner to the training of pears, and an arm was provided on either side, on which two shelves were made, by stretching two wires each, for the purpose of leading current shoots right

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fig	Kadota	1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Masui Dauphine	2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Loquat	Tanaka	3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Mogi	4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Yuvarlak Cukur Gobek	5	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Akko XII	6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Pomegranate	Ruby King	7	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Wonderful	8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Hicaz	9	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Cekirdeksiz	10	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Chestnut	Tsukuba	11	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Tanzawa	12	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Persimmon	Fuyuu	13	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Nishimura Wase	14	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Saefuji	15	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Hiratanenashi	16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Matsumoto Wase	17	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Izu	18	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Cherry	Satohnishiki	19	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Takasago	20	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Apricot	Niigata Ohmi	21	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Heiwa	22	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Plum	Can	23	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Inoue	24	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Sir Prise	25	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Santa Rosa	26	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Sugar	27	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Oh-ishi Nakate	28	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Taiyoh	29	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Nectarine	Hiratsuka Red	30	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Imai Nekutarin	31	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Syuuhoh	32	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Maygrand	33	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Arm King	34	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Peach	Yamafuji	35	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Hakuhoh	36	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Kawanakajima	37	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Akatsuki	38	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Kurakata Wase	39	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Grape	Kaiji	40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Kyohoh	41	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Japanese Pear	Osa-Nijisseiki	42	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Nijisseiki	43	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Hohsui	44	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Kohsui	45	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Shinsui	46	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Tama	47	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
Apple	Fuji	48	○	○	○	○	○	○	○	○	○	○	○	○	○		
	Tsugaru	49	○	○	○	○	○	○	○	○	○	○	○	○	○		
	Stark Earliest	50	○	○	○	○	○	○	○	○	○	○	○	○	○		
	Anna	51	○	○	○	○	○	○	○	○	○	○	○	○	○		

Fig.2-5-9 Variety arrangement in the demonstration field

and left (see the photo). Persimmons were trained to the modified leader type, and the other varieties were trained to the natural open-center type.

5) Examination

In the field, the growth, flowering and fructification of the trees were examined, while properties of fruits were examined at the time of harvest.

Yields were also examined. Regarding those fruits whose yields were somewhat large, a sampling party was held and a questionnaire was conducted on local Turkish people, for the purpose of ascertaining whether these fruits suited their taste or not. Test programs were formulated as follows concerning items necessary for continuing cultivation.

① Test on degrees of fruit thinning
② Test on bagging cultivation
③ Research on the suitability to Turkish people's taste
④ Test on producing and fattening seedless Kyoho (a variety of grapes)
⑤ Storage test on pears

(3) Test Results

1) Growth of Trees

At first, 15 seedlings of each variety were planted. Regarding pears and grapes of trellis training, 14 seedlings each were planted, while for apples of dwarfing training 21 seedlings were planted. Among these seedlings, some were withered, some survived as root stocks, to which grafting was carried out again, and some were subjected to complementary planting. In complementary planting within a row, different varieties were sometime used, and difference in age resulted among the trees. These prevented the finding of average growth of the varieties. The most developed tree was selected from each variety, and its girth 20 cm above the ground, height (up to the tip of the highest branch after pruning), and length and width of its crown were measured. Fig. 2-5-10 shows the situation in the experiment field after complementary planting, etc., and Table 2-5-38(1), (2) shows the measurement results.

a. Fig

Figs grew well on the whole and became almost equal in height. Kadota trees grew steadily without producing vacancies. Masui Dauphine trees were a little shorter than Kadota trees, but their branches developed well. Only one tree was withered in the portion above the ground after sprouting in 1994, and began growing anew from its base. The cause was not identified.

b. Loquat

Although loquats grew comparatively well, they became a little different in height. Three vacancies produced each in Tanaka and Mogi

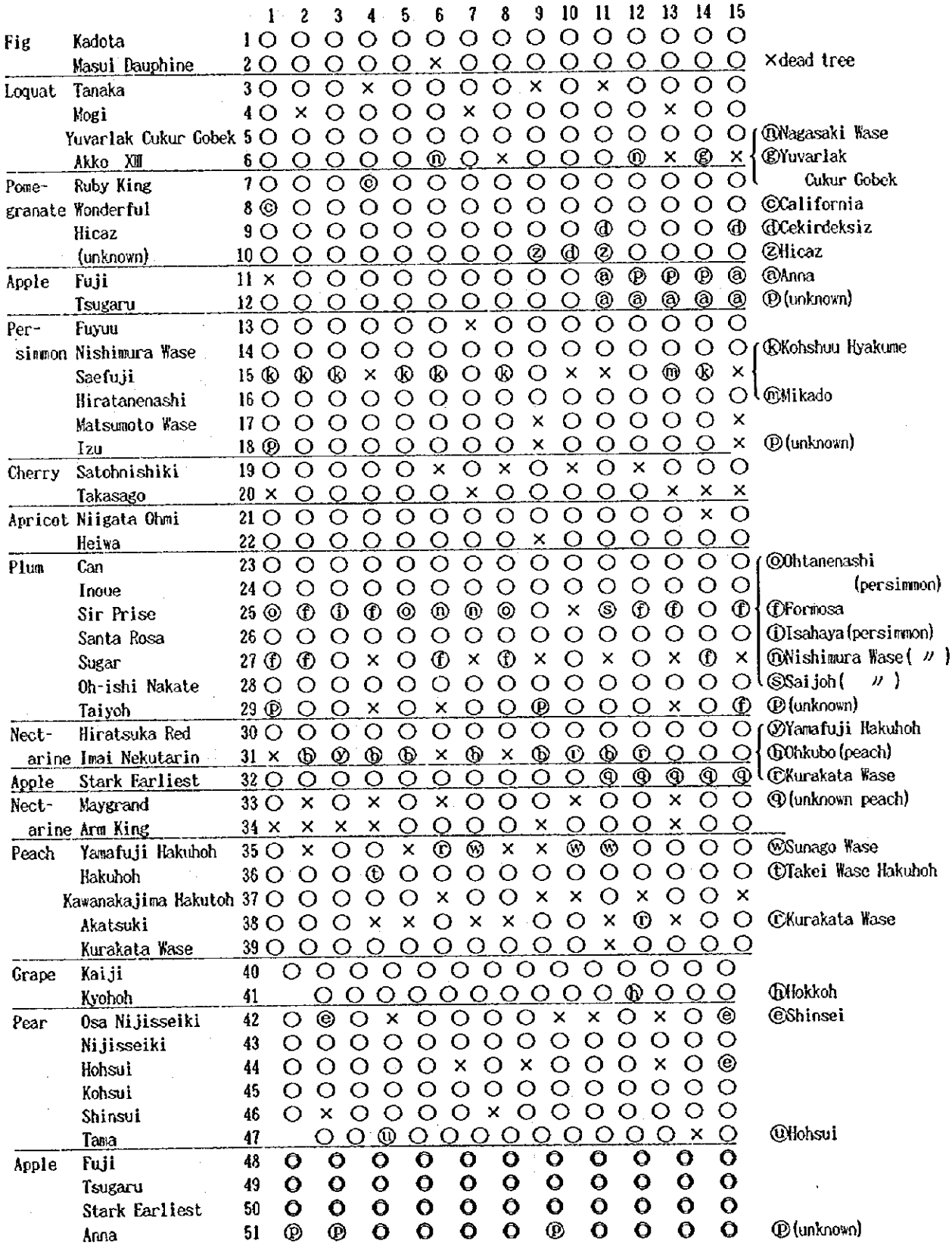

Fig.2-5-10 Situation in the demonstration field (October 1995)

Table 2-5-38(1) Growth of exhibition trees (March 1996)

Kind	Variety	Girth of trunk (cm)	Crown				Present number of trees
			Height a	Diameter(m) I b	Diameter(m) II c	Volume (m³) axbxc	
Fig	Kadota	63.0	224	350	290	22.7	15
	Masui Dauphine	41.0	236	245	250	14.4	15
Loquat	Tanaka	31.5	249	215	220	11.7	12
	Mogi	28.0	236	235	230	12.7	12
	Yuvarlak Cukur Gobek	30.5	215	230	245	12.1	15
	Akko XII	20.5	185	160	200	5.9	4
	Nagasaki Wase	13.2	149	155	175	4.0	2
Pomegranate	Ruby King	35.5	293	310	305	27.7	14
	Wonderful	38.5	333	320	310	33.0	14
	Hicaz	38.0	313	295	290	16.7	15
	Cekirdeksiz	26.5	198	203	205	8.2	3
	California	38.5	310	320	300	29.7	2
Chestnut	Tsukuba	-	-	-	-	-	0
	Tanzawa	-	-	-	-	-	0
Persimmon	Fuyuu	26.0	318	305	300	29.1	14
	Nishimura Wase	32.0	345	325	315	35.3	14
	Saefuji	26.5	297	250	255	19.9	3
	Hiratanenashi	35.5	303	310	300	28.1	15
	Matsumoto Wase Fuyuu	30.0	283	265	250	18.7	14
	Izu	26.5	243	233	225	12.7	13
	Ohtanenashi	29.0	278	283	280	22.0	3
	Isahaya	15.0	203	175	180	6.3	1
	Saijoh	20.0	290	180	185	9.6	1
	Kohshuu Hyakume	12.0	185	110	100	2.0	7
	Mikado	16.5	165	105	85	1.4	1
Cherry	Satohnishiki	28.0	210	208	205	8.9	8
	Takasago	14.5	175	75	60	0.7	4
Apricot	Niigata Ohmi	31.5	273	235	220	12.3	14
	Heiwa	48.5	325	345	330	37.0	14

Table 2-5-38(2) Growth of exhibition trees (March 1996)

Kind	Variety	Girth of trunk (cm)	Crown				Present number of trees
			Height a	Diameter(m) I b	Diameter(m) II c	Volume (m^3) axbxc	
Plum	Inoue	31.0	262	290	285	21.65	14
	Sugar	27.0	208	210	205	8.9	10
	Sir Prise	3.50	295	310	300	27.5	2
	Oh-ishi Nakate	28.5	292	263	255	19.5	15
	Santa Rosa	28.0	236	205	200	9.6	15
	Taiyoh	19.5	255	185	150	7.0	11
Nectarine	Hiratsuka Red	37.o	278	283	280	22.0	15
	Imai Nekutarin	30.0	293	285	295	24.6	3
	(Shuohoh) in error	17.5	123	102	106	1.3	2
	Maygrand	31.5	248	340	350	29.5	8
	Arm King	20.5	183	190	175	6.0	10
Peach	Yamafuji Hakuhoh	23.5	212	295	305	19.0	14
	Takei Wase Hakuhoh	19.8	162	243	250	9.8	1
	Hakuhoh	24.5	198	262	280	14.5	14
	Kawanakajima Hakutoh	25.0	195	355	330	22.8	12
	Akatsuki	24.0	185	277	280	14.3	14
	Kurakata Wase	24.5	197	270	265	14.1	15
	Ohkubo	13.0	108	94	80	0.8	6
	Sunago Wase	23.0	170	230	205	8.0	3
Grape	Kaiji	23.0	-	455	340	(15.5 m^2)	14
	Kyohoh	26.0	-	307	295	(9.1 m^2)	13
	Hokkoh	19.0	-	415	250	(10.4 m^2)	1
Pear	Osa Nijisseiki	21.5	275	193	105	5.5	6
	Sinsei	27.5	295	298	165	14.5	1
	Nijisseiki	24.0	313	295	113	10.4	11
	Hohsui	22.5	251	315	105	8.3	15
	Kohsui	24.0	259	266	104	7.1	14
	Shinsui	23.5	292	267	100	7.8	13
	Tama	20.0	298	320	140	13.0	13
Apple	Fuji	49.0	323	405	325	42.5	21
	Tsugaru	36.8	357	345	302	37.2	21
	Stark Earliest	48.0	374	392	332	48.6	21
	Anna	44.0	387	410	312	49.5	21

seemed to have been caused by fatigue from transport from Japan, because the growth of the other loquat trees was not impeded at all.

Regarding Turkish varieties, all the Yuvarlak Cukur Gobek trees grew well without vacancies, while seven vacancies were produced in Akko XII, accounting for about 50% (one was subjected complementary planting later). This fact was difficult to explain.

The Nagasaki Wase trees, which were complemented two years later and therefore four years old, grew generally well, though small in size.

c. Pomegranate

The four varieties of pomegranates grew steadily. Several trees, which had been injured by insects eating into trunks, were withered in the portion above the ground and made fresh growth. Branches developing a fresh extended well. As pomegranate seedlings are often grown in cuttings, trees growing afresh can be of the same variety as before.

In each of the rows of Ruby King and Wonderful, one tree of a different variety was found. These different seedlings, which had been included in the seedlings sent from Japan, were identified as an American variety called California, according to the catalog prepared by the seedling company in Japan.

In the row of Cekirdeksiz, a Turkish variety, only one tree among 15 trees was of Cekirdeksiz, while two were of Hicaz and the remaining 12 were of unknown varieties.

As there were two Cekirdeksiz in the row of Hicaz, Cekirdeksiz trees totaled to three.

d. Chestnut

The two varieties of chestnut grew very little from the beginning. The Tsukuba trees were withered in four years after being planted. Two Tanzawa trees survived until the spring of 1994, though in a dying condition. As these trees were not expected to grow any longer, they were not counted in the test.

Japanese chestnuts seemed to have no adaptability to this district. Although causes could not be identified in the test lasting for only a short period of time, alkalinity of the soil seemed to have something to do with the fact, because Japanese chestnuts preferred acid soil.

e. Persimmon

The growth of persimmon trees differed from variety to variety. Hiratanenashi and Nishimura Wase trees grew comparatively steadily, followed by Fuyuu and Matsumoto Wase Fuyuu trees.

Izu and Saefuji trees were a little inferior in growth. Ohtanenashi trees were complements planted one year later, while Isahaya and Saijoh trees were complements planted two years later. They were small in size and fruited first 1995.

It seemed that Saefuji trees had been planted as pollination trees. As they produced persimmons so inferior in quality that Kohshuu Hyakume and

Mikado varieties were grafted on them in the spring of 1994, with three among them being left as they were. The grafted trees grew so well and became substantial that they bore fruit in the following year.

f. Cherry

The two varieties of cherry trees did not show satisfactory growth. Satohnishiki trees grew better, while Takasago trees began to have an increasing number of yellow leaves during summer and ceased growing. In 1995, some of the Takasago trees became smaller because of the dying back of branches.

g. Apricot

The Heiwa trees grew steadily, while Niigata Ohmi trees tended to discontinue growing during summer, resulting in rather poor growth.

h. Plum

The Santa Rosa trees grew best. Oh-ishi Nakate trees were small on the whole,though almost equal in size, as they were complements planted two years later. The growth of Taiyoh trees, which were also complements planted two years later, was retarded, and vacancies were produced again. Sugar seedlings were not in good condition from the beginning, and many of them survived as root stocks. Only four survived as trees, but they did not grow well. Sir Prise trees did not take root satisfactorily from the beginning, and two small trees survived. Inoue trees were small on the whole.

i. Nectarine

Nectarine trees grew to different heights on the whole. None of the varieties showed uniform growth. Irregular growth seemed to be caused by different degrees of chlorosis. Chlorosis was found in many of the nectarine trees as in peach trees.

One of the May Grand trees grew big, but the other trees of this variety were small and most irregular in growth. Arm King and Hiratsuka Red trees grew fairly well.

Imai Nekutarin trees showed extremely poor root taking, and they were withered except for three. They showed average growth.

Shuuhoh had been replaced by a peach variety by mistake. Shuuhoh was not included in the varieties for testing. Trees bore ordinary peaches with hairs on the skin. It was impossible to identify the variety of these peaches. These peach trees were grown on plum root stocks, and many were withered due to poor growth. Five survived, but they did not seem worthy of testing.

j. Peach

Chlorosis was found in many of the peach trees as in nectarines. Peach trees did not grow well on the whole. Among the varieties, Akatsuki,

Kurakata Wase, Hakuhoh and Kawanakajima Hakutoh grew comparatively well, followed by Yamafuji Hakuhoh. Takei Hakuhoh, Ohkubo and Sunago Wase, which were complements planted two years later, did not show normal growth. Especially Ohkubo which had grown from plum root stocks was not suitable for testing. This, together with the wrong seedlings for Shuuhoh, showed that careful preparation was necessary for initiating a test.

k. Grape

The three varieties of grape grew vigorously. They did not seem to be affected by the unfavorable soil conditions at all. There was one Hokkoh seedling among the Kyohoh seedlings.

l. Pear

The growth of the Nijisseiki and Tama trees was steady and uniform, though it was about half the growth in Japan. Chlorosis was conspicuous in early stages of growth in spring, and then decreased gradually. Even while chlorosis was not remarkable, the soil conditions seemed to affect the trees unceasingly, and they did not grow well, as a result.

The Hohsui and Kohsui trees showed poorer, irregular growth, and chlorosis was more conspicuous. The smallest tree did not grow with the lapse of time, but it was not withered, maintaining almost the same size, as if desperately seeking for the opportunity to grow in the highly alkaline soil.

The Shinsui, Shinsei and Osa Nijisseiki trees, which were complements planted two years later, grew well on the whole, though rather small in size.

m. Apple

The Fuji, Tsugaru, Stark Earliest and Anna trees grew well. The Fuji and Tsugaru trees should have been grafted on dwarf stocks, but they were too vigorous to set flower buds. Even they were given smaller quantities of irrigation water than the other varieties, a number of branches developed, producing a sight of brooms erected upside down. The fact that a number of branches developed did not seem to be attributable only to the speed of development. It could be attributable also to the prolonged period of development due to temperatures not having lowered in the fall. This, what is called autumnal development, impeded the differentiation and the growth of flower buds. Under these circumstances, the trees which had been planted at intervals of 2 m grew so thick in four years that the rows became ill ventilated. In the spring of 1994, every second tree was thinned out. The thinned trees comprised four varieties, and there were ten in each variety. These trees were transplanted to vacancies caused by withering. By giving up experiments on chestnuts, 30 of the thinned apple trees were planted in two rows where chestnut trees had been planted, and ten were planted in the row of five peach trees of unknown varieties, which had been planted by the mistake on seedlings of Shuuhoh and were transplanted

aside. This was done with the expectation of not only effects from thinning but also the differentiation of flower buds due to effects from controlling growing force by transplanting. Among the transplanted trees, one Fuji tree was withered, but the other 39 trees took roots and grew steadily, bearing a considerable number of apples in the following year.

The results of these experiments showed that apples, grapes, pomegranates, loquats and figs grew in the same manner as in Japan. These species grew well, irrespective of varieties.

Persimmons and apricots showed the second best growth. The growth of these differed from variety to variety. Hiratanenashi and Nishimura Wase trees among the persimmon trees, and Heiwa trees among the apricot trees, grew ordinarily, when compared with that in Japan. Although Fuyuu (a persimmon variety) trees seemed to show slightly poorer growth, they grew nearly ordinarily when compared with that in Japan.

Pears and plums showed the third best growth. Although they seemed to be slightly affected by the unfavorable soil conditions on the whole, some varieties showed nearly ordinary growth. Ordinary growth could be expected through careful management.

Cherries, peaches and nectarines showed poor growth. They were obviously affected by the unfavorable soil conditions, and their growth was restrained to a great extent. If they were to be planted in places where chlorosis is apt to break out, careful management could not be readily effective. Still, Early Red and Dixi Red (peach varieties) trees, which showed poor growth in the central part of the adjacent verification field, grew well in the southern and the northern sides of the experiment field. In view of this fact, it would be possible to grow peaches if proper places were selected for them. Chestnuts, not taking roots in the beginning,did not grow at all. Experiments on chestnuts were therefore given up, as it was difficult to identify causes of poor root taking in a short period of time.

Table 2-5-39 (1) - (6) shows the growth phases of trees in 1993 and 1994.

Pomegranates sprouted first, and the other deciduous fruit trees sprouted almost simultaneously.

Although a sufficient number of flower buds appeared in apricot trees in the spring of 1994, buds did not grow. Most flower buds appearing in fruit-bearing branches showed no signs of expansion in spring. A small number of flower buds began growing only from place to place, and only part of them flowered. Trees consequently bore only a small number of apricots in 1994. In 1995, the situation was much the same. A similar situation was observed in the growth of cherries in 1994. Cherries, however, flowered very well in the spring of 1995. The other species did not show such a tendency. Apricots and cherries, which were suitable for cultivation in cold regions, seemed to be affected by the abnormally warm winter of 1994, in addition to the fear of insufficient chilling during winter in this district. Leaf buds, however,did not seem to be affected by insufficient chilling in any species. A farmer who grew apples in the Adana district on a trial basis told that

Table 2-5-39(1) Growth of demonstration fruit trees and yields of fruits (1993～1995)

Kind	Variety	Year	Sprouting date	Leafing date	Flowering date	Full bloom date	End of Flowering	Beginning of Harvest	Full-scale Harvest	End of Harvest	Yield kg	Number of Trees
Fig	Masui Dauphine normal fruit	1993	3.19	4.12	—	—	—	7.21	9.25	10. 4	271.7	15
		1994	3.16	4. 5	—	—	—	7.11	8.15	9.19	287.8	14
		1995	2.28	3.17	—	—	—	7.17	8.19	9. 7	280.0	14
	summer fruit	1995						6.20	6.20	6.28	0.8	14
	Kadota normal fruit	1993		4.12	—	—	—	7.28	9.25	10. 4	264.5	15
		1994	3.15	3.30	—	—	—	7.13	8.15	9.19	328.1	15
		1995	2.28	3.15	—	—	—	7.18	8.21	9. 7	199.5	15
	summer fruit	1994									(450 g)	15
		1995						6.19	6.20	6.20	7.8	15
Cherry	Satoh Nishiki	1993							5.31		(43.3g)	14
		1994	3.28	4. 3	4. 5	4.13	4.15		5.30		0.5	14
		1995	3.16	3.23	3.20	3.27	4. 5	5. 8		5.17	(639 g)	14
	Takasago	1993							5.28		(72.1g)	16
		1994	3.26	4. 1	4. 3	4.11	4.14		5.30		(14.5g)	16
		1995	3.11	3.18	3.18	3.24	3.29	5. 8		5.17	(305 g)	9
Nectarine	Hiratsuka Red	1993						7.15		7.21	4.1	15
		1994	3.19	3.26	3.21	3.29	4.12		7.11		41.0	15
		1995	3.10	3.19	3.12	3.2	3.25	7. 5	7.10	7.17	95.0	15
	Imai Nekutarin	1993						7.19		7.23	(920 g)	3
		1994	3.20	3.28	3.23	3.28	4. 9		7.11		6.5	3
		1995	3.11	3.19	3.13	3.18	3.24	7. 5	7. 7	7.10	24.5	3
	(Shuuhoh) in error	1994	3.20	3.29	3.21	3.28	4.10		6.28		6.0	5
		1995	3.12	3.21	3.12	3.18	3.24		7.10		1.0	4
	Maygrand	1993							7.19		(467 g)	12
		1994	3. 8	3.18	3.14	3.24	4. 7	6.17		6.22	29.5	12
		1995	3. 8	3.15	3. 6	3.14	3.20	6.15		6.21	26.0	10
	Arm King	1993							6.30		(118 g)	11
		1994	3. 8	3.18	3. 7	3.20	4. 4	6. 3		6. 7	22.0	11
		1995	3. 8	3.13	3. 4	3.11	3.18	6. 2	6.12		16.0	10

Table 2-5-39(2) Growth of demonstration fruit trees and yields of fruits (1993～1995)

Kind	Variety	Year	Sprouting date	Leafing date	Flowering date	Full bloom date	End of Flowering	Beginning of Harvest	Full-scale Harvest	End of Harvest	Yield kg	Number of Trees
Loquat	Tanaka	1993	—					6. 7		6.15	3.3	12
		1994	—	3.30	93.10.20	1.15	1.20	5.20		5.27	6.7	12
		1995	—	3. 8	94.12.20	1.30	2.15		5.30		3.0	12
	Mogi	1993	—					6. 7		6.15	2.1	11
		1994	—	3.20	93.10.15	1.10	1.15	5.20		5.27	13.8	11
		1995	—	3. 8	94.12.15	1.23	2.10	5.22		5.30	27.0	11
	Nagasaki Wase	1994	—	3.15	93.10.20	1.25	2. 5		5.20		0.3	2
		1995	—	3. 4	94.12.25	1.15	2.1	5.16		5.30	1.6	2
	Yuvarlak Cukuru Gobek	1993	—					6. 7		6.15	6.6	15
		1994		3.20	93.12.10	1.25	2. 5	5.20		5.27	52.4	15
		1995	—	3. 8	94.12.25	1.30	2.15	5.30	5.30	6.20	38.5	15
	Akko-XIII	1993	—					6.7		6.15	0.5	8
		1994	—	3.15	93.12.15	1.28	2. 8	5.20		5.27	7.5	8
		1995	—	3. 8	95. 1. 5	1.23	2.10	—	—	—	— *	8
Pomegranate	Ruby King	1993						9.20	10. 8	11. 8	19.5	14
		1994	2.25	3.18	4.26	5.25	6. 5	10. 3	10.11	10.31	166.0	14
		1995	2.15	3. 2	5. 3	5.26	6.10		10.16	10.23	93.0	14
	Wonderful	1993						9.20	10. 8	11. 8	39.0	14
		1994	3. 1	3.20	4.26	5.25	6. 5		10. 3	10.31	184.3	14
		1995	2.23	3. 5	5. 4	5.26	6.13		10.16	10.23	110.0	10
	Hicaz	1993						9.20	10. 8	11. 8	31.0	15
		1994	3. 1	3.20	4.26	5.25	6. 5	10. 3	10.11	10.31	148.7	15
		1995	2.23	3. 5	5. 5	5.26	6.12	10. 3	10.16	10.23	213.0	14
	Cekirdeksiz	1993						9.20	10. 8	11. 8	32.0	15
		1994	3. 1	3.20	4.25	5.20	6. 2	9.20	10.11	10.24	125.5	15
		1995	2.23	3. 5	5. 2	5.25	6. 7		10.16		20.0	2
	California	1994	2.22	3. 4	5. 4	5.26	6.12	9.20		10. 3	20.0	2
		1995	2.23	3. 5	5. 2	5.25	6. 8		10.16		5.0	2

Note: * Fruits of this year were damaged at all by very strong sunlight just before maturing.

Table 2-5-39(3) Growth of demonstration fruit trees and yields of fruits (1993～1995)

Kind	Variety	Year	Sprouting date	Leafing date	Flowering date	Full bloom date	End of Flowering	Beginning of Harvest	Full-scale Harvest	End of Harvest	Yield kg	Number of Trees
Apricot	Niigata Ohmi	1993						6. 7		6.11	13.2	15
		1994	3.18	3.31	3.25	3.30	4.10	6. 2	6. 3	6. 6	(270 g)	15
		1995	3. 8	3.20	3. 8	3.12	3.18		5.29	6. 2	4.0	15
	Heiwa	1993						6. 7		6.11	10.7	15
		1994	3.15	3.30	3.16	3.28	4. 7	6. 2	6. 6	6.13	1.0	14
		1995	3. 6	3.16	3. 6	3.10	3.17	5.25	5.29	6.12	25.5	14
Peach	Yamafuji Hakuhoh	1993							7.23		(204 g)	9
		1994	3.20	3.28	3.20	3.28	4.10		7.20		24.0	9
		1995	3.11	3.18	3.16	3.21	3.26		7.17		55.0	7
	Takei Wase Hakuhoh	1993							6.22		(666 g)	10
		1994	3.20	3.28	3.24	3.30	4.13	6.16		6.19	48.5	10
		1995	3. 1	3.10	3. 8	3.15	3.21	6. 9	6.12	6.19	59.5	9
	Hakuhoh	1993							7.19		2.5	14
		1994	3.23	3.30	3.27	4. 5	4.14	7. 7		7.11	83.0	14
		1995	3. 3	3.11	3. 8	3.15	3.20	7. 5	7.10		76.0	14
	Kawanakajima Hakutoh	1993							8.16		1.8	11
		1994	3.23	3.30	3.26	4. 7	4.12	7.22	7.29	8. 1	67.0	11
		1995	3. 2	3.10	3.12	3.19	3.30	7.27	7.31		119.0	11
	Akatsuki	1993							7.12		(484 g)	9
		1994	3.20	3.28	3.23	3.28	4. 8		7. 4		32.5	9
		1995	3. 2	3.11	3.12	3.18	3.26		7. 5		56.5	8
	Kurakata Wase	1993						7. 2		7. 5	2.1	10
		1994	3.20	3.28	3.24	3.30	4.13	6.20		6.28	89.4	10
		1995	3. 1	3.10	3. 5	3.12	3.18	6.20	6.23	6.26	156.0	25
	Ohkubo ** (Plum stock)	1993						—	—	—	—	6
		1994	3.23	3.31	3.26	3.30	4.15	7.20		7.25	4.5	6
		1995	3.18	3.25	3.19	3.25	3.29	—	—	—	—	6
	Sunago Wase	1993						—	—	—	—	13
		1994	3.21	3.29	3.24	3.29	4.11	6.28		7.11	30.5	13
		1995	3. 3	3.12	3.10	3.16	3.22		7.10		33.5	13

Note: ** As this seedlings had been made by grafting to plum stocks. the growth is abnormal.

Table 2-5-39(4) Growth of demonstration fruit trees and yields of fruits (1993～1995)

Kind	Variety	Year	Sprouting date	Leafing date	Flowering date	Full bloom date	End of Flowering	Beginning of Harvest	Full-scale Harvest	End of Harvest	Yield kg	Number of Trees
Persimmon	Fuyuu	1993							11.19		14.5	14
		1994	3.15	3.30	4.26	5. 1	5. 4	10.17	10.21	10.31	8.5	14
		1995	3. 3	3.15	4.30	5. 5	5. 8	10.30	11.15	11.30	60.5	14
	Nishimura Wase	1993						9.20	9.25	10. 4	28.8	15
		1994	3. 8	3.30	4.19	4.26	4.30					15
		1995	3. 3	3.15	4.27	5. 1	5. 5	9.28	10. 5	10.16	51.0	15
	Saefuji	1993						11. 8		11.15	6.0	12
		1994	3.20	4. 2	4.22	4.29	5. 2		9.20	9.27	5.0	3
		1995	3. 6	3.18	4.28	5. 4	5. 8		10.23	10.27	17.0	3
	Hiratanenashi	1993						11. 8	11.15	11.19	112.5	15
		1994	3. 5	3.20	4.21	4.27	4.30	10. 3	10.11	10.30	37.0	15
		1995	2.28	3.10	4.25	4.28	5. 2	10.23	10.27	11.15	273.0	15
	Matsumoto Wase Fuyuu	1993							11.19		13.5	14
		1994	3.15	3.29	4.25	5. 1	5. 5		10.31		1.3	14
		1995	3. 8	3.18	4.30	5. 4	5. 8	10.23	11.27	11.30	51.5	14
	Izu	1993							11. 8		12.5	14
		1994	3.12	3.29	4.25	5. 1	5. 5	9.20	10. 7	10.31	23.0	14
		1995	3. 5	3.16	4.30	5. 4	5. 8	10.16	10.23	11.15	49.0	14
	Ohtanenashi	1993						—	—	—	—	3
		1994	3. 8	3.25	—	—	—					3
		1995	3. 2	3.15	4.24	4.27	5. 1		11.16		1.3	3
	Isahaya	1993						—	—	—	—	1
		1994	3.12	3.30	—	—	—					1
		1995	3. 4	3.18	4.26	5. 1	5. 3		11.16		1.2	1
	Saijoh	1993						—	—	—	—	1
		1994	3.12	3.28	—	—	—					1
		1995	3. 5	3.19	4.27	5. 1	5. 4		10.23		(162 g)	1
	Kohshuu Hyakume	1995	3. 5	3.18	5. 4	5. 8	5.10	11. 1	11.16		4.9	7
	Mikado	1995	3. 5	3.18	4.28	5. 2	5. 5		11.16		1.9	1

Table 2-5-39(5) Growth of demonstration fruit trees and yields of fruits (1993～1995)

Kind	Variety	Year	Sprouting date	Leafing date	Flowering date	Full bloom date	End of Flowering	Beginning of Harvest	Full-scale Harvest	End of Harvest	Yield kg	Number of Trees
Plum	Inoue	1993								6.25	(238 g)	15
		1994	3.22	5.28	3.25	3.30	4. 8		6. 9		3.1	15
		1995	3. 2	3. 8	3. 5	3.12	3.20		6. 5		9.5	15
	Sir Prise	1993						—	—	—	—	2
		1994	3.23	3.28	3.25	3.29	4. 8	—	—	—	—	2
		1995	3. 5	3.11	3. 5	3.12	2.22		6. 5		4.0	2
	Santa Rosa	1993								6.28	3.2	15
		1994	3.24	3.30	3.22	3.28	4. 8	6.17		6.28	50.5	15
		1995	3. 5	3.10	3. 2	3.11	3.20		6.21		288.0	15
	Sugar	1993						—	—	—	—	5
		1994	3.29	4. 6	4.15	4.18	4.21	—	—	—	—	5
		1995	3.18	2.25	3.26	3.29	4. 1	—	—	—	—	5
	Oh-ishi Nakate	1993							6.25		(147 g)	15
		1994	3.21	3.29	3.25	3.30	4.10		6. 9		0.79	15
		1995	3. 3	3.11	3. 1	3. 8	3.18		6. 5	6. 9	61.5	15
	Taiyoh	1995	3. 3	3. 8	3. 1	3. 9	3.15		7.10		13.0	7
	(Taiyoh) in error	1994	3. 8	3.20	3.12	3.21	4. 4	6.17		6.23	6.3	3
		1995	2.25	3. 5	2.29	3. 4	3.13		6.15		93.0	3
Apple	Fuji	1993						—	—	—	—	21
		1994	3.29	4. 8	4.15	4.20	4.25		10.31		1.05	20
		1995	3. 7	3.15	4. 4	4.10	4.15		10.16		20.5	20
	Tsugaru	1993						—	—	—	—	21
		1994	3.29	4. 5	4.15	4.21	4.25	8. 3	8.11	8.19	2.0	21
		1995	3.11	3.18	4. 4	4.14	4.20	8. 7	8. 7	8.17	4.5	21
	Stark Earliest	1993							6.23		2.6	21
		1994	3.25	4. 2	4.14	4.19	4.23		6.23	7. 1	3.9	21
		1995	3.19	3.26	3.29	4. 9	4.15		6.28	6.30	58.0	21
	Anna	1993						7.30		8.14	14.7	15
		1994	3. 1	3. 5	3. 5	3.10	3.20		7.11		15.0	15
		1995	2. 5	2.12	2.20	3. 5	3.15		7.17	8. 1	18.0	15

Table 2-5-39(6) Growth of demonstration fruit trees and yields of fruits (1993～1995)

Kind	Variety	Year	Sprouting date	Leafing date	Flowering date	Full bloom date	End of Flowering	Beginning of Harvest	Full-scale Harvest	End of Harvest	Yield kg	Number of Trees
Grape	Kaiji	1993							10.14		22.0	14
		1994	3.25	4. 1	5. 1	5.10	5.14		8.31	9.21	66.0	14
		1995	3.15	3.25	5. 5	5.15	5.20	9. 7	9.19		164.0	14
	Kyohoh	1993						7.26	7.28	8.10	50.7	13
		1994	3.28	4. 4	4.30	5. 8	5.12	7.13		8. 4	79.0	13
		1995	3.20	3.29	5. 5	5.15	5.19	7.17	7.31	8. 4	96.0	13
	Hokkoh	1993										1
		1994	3.26	4. 2	5. 1	5.11	5.14		7.28		(400 g)	1
		1995	3.12	3.23	5. 5	5.12	5.23	9.11		9.19	9.5	1
Japanese pear	Nijisseiki	1993						9. 1		9.10	76.3	14
		1994	3.22	3.26	4. 6	4.13	4.17	8.23		9.12	61.5	14
		1995	3. 8	3.15	3.23	3.29	4. 4	8.21	8.25	9.11	112.5	14
	Hohsui	1993						8.19	8.23	9. 6	23.8	11
		1994	3.20	3.26	4. 1	4.10	4.13	8.17		8.23	33.0	11
		1995	3. 6	3.13	3.20	3.25	3.29	8.14	8.14	9. 1	39.5	11
	Kohsui	1993						8.16		8.22	22.8	14
		1994	3.20	3.26	4. 2	4.10	4.14	8. 8		8.11	28.5	14
		1995	3. 6	3.14	3.23	3.29	4. 5		8. 8	8.18	49.0	14
	Shinsui	1993						—	—	—	—	12
		1994	3.22	3.25	4. 4	4.10	4.13		8. 8		5.0	12
		1995	3. 8	3.16	3.29	4. 3	4. 9		8.18		2.5	7
	Tama	1993						7.26	8. 4	8.19	42.8	13
		1994	3.20	3.25	4. 2	4.13	4.15	8. 1	8. 4	8. 8	38.5	13
		1995	3. 1	3.10	3.18	3.24	3.29		7.24	7.31	65.0	13
	Osa Nijisseiki	1993										5
		1994						8.23	9.12		26.0	
		1995	3.12	3.18	3.25	3.31	4. 6	9. 4	9. 4	9.11	44.0	5
	Shinsei	1993										2
		1994						8.23	9.12		10.9	
		1995	3.14	3.20	3.27	4. 1	4. 7	9. 4		9.11	1.7	2

trees hardly bore apples in 1994 when it was abnormally warn in winter, although they flowered very well in cold winter. A more serious problem in the apples in the experiment field seemed that the insufficient lowering of temperature from summer to the early fall, rather than insufficient chilling during winter, caused trees to set a smaller number of flower buds. The other species of trees did not seem to be affected by insufficient chilling during winter.

In the spring of 1995, trees sprouted and leafed out 10 to 15 days earlier than in 1994, and current shoots rapidly developed. On March 27, however, the temperature marked as low as 1.5 ℃, and 2.1 ℃ on April 5, and these low temperatures affected infant shoots of some species.

The varieties of pomegranates sprouted between February 15 and 23 and developed leaves between March 2 and 5. Current shoots which had already grown up to 5 cm to 6 cm from the end of March to the beginning of April could not stand low temperatures of as low as 1 ℃ or 2 ℃, and disorder was caused in them at the softest portion near the growth point. Consequently new leaves became willowy. This disorder, lasting for more than one month, gave adverse effects on the flower setting of pomegranates which set flower sat the tips of current shoots, resulting in very poor flowering. Normal conditions were recovered from June onward, but after effects affected not only the growth of trees but also yields of pomegranates.

The same disorder appeared in the tips of current shoots of persimmons. Seriously injured shoots bent at their tips, and young leaves stopped growing and died. In slightly injured ones, several leaves near the tips of current shoots became willowy, and then normal conditions were recovered. This disorder affected the flower setting of persimmons which set flowers on current shoots, as in the case of pomegranates, but young buds narrowly escaped falling, because they set flower buds near the bases of current shoots. Current shoots, recovering themselves, resumed ordinary growth.

In Can, Papaz, Formosa (plums) and Niigata Ohmi (apricot), several young leaves near the tips of current shoots did not develop, and became willowy. Then these portions became as good as naked, over a length of 10 cm to 20 cm.

In grapes, some leaves at the tips of trees became slightly depauperate, seemingly due to viruses. In the past, depauperate leaves sometimes appeared at the bases of trees, but causes could not be identified. As the case was similar to those cases appearing in other kinds of trees, the cause was identified as a cold injury.

In the other species of fruit tree, no particular abnormal conditions appeared.

The time of fruit maturing was earlier by more than one week in most species of trees in 1994 than in 1993. This seemed not to be affected by temperatures during winter but to have relation with the rapid temperature rise from spring to summer. This was attested by the fact that the harvest time did not come earlier in 1995 due to effects of chilling after earlier sprouting in spring.

2) Fruit Production

Trees began bearing fruits in 1992, the third year after planting, and 58 varieties of 12 species bore fruits by 1995. Sugar (plum) trees bore no fruit. The two persimmon varieties which were subjected to grafting in the previous year bore fruit in two years. Yields of each variety are mentioned in Table 2-5-39.

Among the varieties which bore fruits, four bore fruits for the first time in 1995, and harvests from these trees were very small. Yields were, however, gradually increased in many varieties year after year. Varieties whose yields were largest included Hiratanenashi (persimmon), Santa Rosa (plum), Hicaz (pomegranate), and Masui Dauphine and Kadota (figs). These varieties each produced around 200 kg of fruit. Varieties whose yields were second largest included Nijisseiki (pear), Kurakata Wase and Kawanakajima Hakutoh (peaches), Kaiji and Kyohoh (grape), Hiratsuka Red (nectarine), and Ruby King and Wonderful (pomegranates). They each produced around 100 kg of fruit. Varieties whose yields each were around 50 kg included Stark Earliest (apple), Tama, Kohsui and Hohsui (pears), Akatsuki, Hakuhoh and Yamafuji Hakuhoh (peaches), Oh-ishi Nakate (plum), Fuyuu, Matsumoto Wase Fuyuu, Izu and Nishimura Wase (persimmons) and Yuvarlak cukur gobek (loquat). Increased yields could be expected from them. The other varieties bore fruits only in small quantities. It seemed impossible to expect yields especially from Satohnishiki and Takasago (cherries), Niigata Ohmi and Heiwa (apricots), Sir Prise and Inoue (plums) and Ohkubo (peach). This was attributable to either the growth of trees or the setting or maturing of flower buds.

Hiratanenashi (persimmon) had been get in 1993 and 1995 in a good store of produce as 112.5 kg and 273 kg respectively, but 1994 is a poor year for its produce as 37 kg only because of little flower setting. It may be caused by biennial bearing, so that it will not be able to harvest annually unless with yielding limitation by fruit thinning in high fruiting year.

Varieties of a Loquats (Eriobotrya Japonica) that were planted initially called as Mogi and Yuvarlak cukur gobek were comparatively well grown and harvested in 1995. However, varieties as called Tanaka and Akko Ⅻ were bred a disease of severe sun scald arising from unusual high temperature during 3 days in May 22, 23, and 24, 1995 (daily maximum temperatures were 40.0℃, 41.3℃ and 41.1℃ respectively) that the period was harvestable time of them immediately after coming into a time of maturity in spite of growing well up to the time of it as the other varieties mentioned above. There were about 20 kg in volume of fruits in both varieties, but there had remained only 3 kg in Mogi and nothing had remained in Akko Ⅻ. For sun scald proofing, an effective way may be covering the fruit cluster by a like paper bag. In this year, the fruits had covered by paper bag made of news paper too, but unfortunately it is not useful because of pasting failure.

A result of characteristic test of harvested fruits is shown in Tables 2-5-40 and 2-5-41.

Table 2-5-40 (1) Characteristics of harvested fruits (1993～1995)

Kind	Variety	Year	Harvest date	Fruit weight g	Sugar content Brix	Fruit diameter I cm	Fruit diameter II cm	Fruit height cm	pH	Note
Fig	Masui Dauphine Summer Fruit	1993	7. 2	165.0	18.3	7.8	7.8	8.6	-	
		1994	-	-	-	-	-	-	-	
		1995	6.20	161.6	16.5	6.6	6.6	7.9	5.4	
	Normal Fruit	1993	7.21	114.2	19.4	6.4	5.7	6.5	-	Fruit weight at 30.Sept.: 55.7g
		1994	7.11	96.7	17.6	6.1	6.0	6.4	-	
		1995	7.17	87.7	16.0	5.7	5.7	5.6	-	Fruit weight at 7.Sept.: 66.9g
	Kadota Summer Fruit	1993	-	-	-	-	-	-	-	
		1994	6.23	49.1	20.9	4.9	4.9	6.2	-	
		1995	6.19	88.2	15.0	6.3	6.3	5.9	5.4	
	Normal Fruit	1993	7.28	66.1	21.6	5.4	4.2	6.3	-	Fruit weight at 30.Sept.: 26.7g
		1994	7.13	51.3	19.8	5.1	4.9	5.3	-	
		1995	7.17	52.5	17.6	4.9	4.9	4.4	-	Fruit weight at 7.Sept.: 35.8g
Cherry	Takasago	1993	5.28	3.3	16.8	1.9	1.6	1.8	-	
		1994	6.13	2.9	21.1	1.6	1.3	1.6	-	Only 5 fruits
		1995	5. 8	4.0	15.9	1.8	1.5	1.8	2.9	
	Satohnishiki	1993	5.31	7.2	25.2	2.5	2.0	2.0	-	
		1994	6.13	4.9	22.2	2.1	1.8	2.1	-	Only 1 fruits
		1995	5. 8	5.1	14.2	2.0	1.7	2.0	3.0	
Nectarine	Arm King	1993	6.30	58.9	12.8	4.2	4.5	4.9	-	
		1994	6. 3	88.2	14.7	5.2	5.1	5.5	-	
		1995	6. 2	124.0	11.4	6.1	5.8	6.4	3.6	
	Hiratsuka Red	1993	7.15	103.3	17.2	5.6	5.8	5.9	-	
		1994	7.11	121.2	16.2	5.8	5.9	6.0	-	Acid: 1.83%
		1995	7.10	131.5	15.6	6.1	6.0	6.1	3.4	
	Maygrand	1993	7.19	93.5	12.1	5.5	5.7	6.0	-	
		1994	6.17	122.0	14.8	5.8	5.7	6.1	-	
		1995	6.15	149.9	15.2	6.5	6.1	6.7	3.3	
	Imai Nekutarin	1993	7.15	92.0	17.0	5.5	5.5	5.8	-	
		1994	7.11	117.2	17.0	6.0	5.9	6.1	-	Acid: 1.57%
		1995	7. 5	112.7	14.5	5.9	5.8	5.9	3.3	

Table 2-5-40 (2) Characteristics of harvested fruits (1993～1995)

Kind	Variety	Year	Harvest date	Fruit weight g	Sugar content Brix	Fruit diameter I cm	Fruit diameter II cm	Fruit height cm	pH	Note
Loquat	Mogi	1993	6. 7	25.6	11.2	3.7	3.6	4.8	-	
		1994	5.20	21.4	15.4	2.9	3.0	3.0	-	
		1995	5.22	31.1	12.7	3.5	3.5	5.4	3.9	
	Tanaka	1993	6. 7	29.7	11.0	4.1	3.1	5.0	-	
		1994	5.27	30.8	13.4	3.4	3.4	4.7	-	
		1995	5.30	46.8	13.5	4.1	4.1	5.8	3.5	
	Akko XIII	1993	6. 7	24.7	11.0	4.1	4.0	4.4	-	
		1994	5.20	23.2	14.1	2.8	3.2	3.6	-	
		1995	-	-	-	-	-	-	-	
	Yuvarlak cukur gobek	1993	6. 7	37.1	10.6	4.2	4.1	4.2	-	
		1994	5.20	37.2	10.8	4.1	4.0	4.2	-	
		1995	5.30	40.9	10.1	4.2	4.2	4.6	3.7	
	Nagasaki Wase	1993	-	-	-	-	-	-	-	
		1994	5.20	24.4	13.0	3.2	3.2	4.0	-	First fruiting
		1995	5.16	38.5	14.0	3.7	3.7	5.5	4.4	
Pomegranate	California	1993	-	-	-	-	-	-	-	Variety name not decided yet
		1994	9.20	624.9	15.0	11.4	11.1	9.9	-	
		1995	10.16	598.4	14.7	10.9	10.9	9.5	2.9	Rate of berries: 39%
	Cekirdeksiz	1993	9. 7	375.2	15.5	9.1	9.1	8.4	-	
		1994	9.20	387.1	16.6	9.9	9.6	8.5	-	
		1995	10.16	536.7	14.8	10.6	10.6	8.9	3.8	Rate of berries: 57%
	Wonderful	1993	9.20	329.4	16.7	9.1	8.6	8.0	-	
		1994	10. 3	422.5	16.5	10.4	8.6	9.4	-	
		1995	10.16	425.7	15.5	9.5	9.5	8.2	3.0	Rate of berries: 47%
	Hicaz	1993	9.20	307.9	17.2	8.9	8.6	7.8	-	
		1994	10. 3	390.7	15.4	10.0	8.7	8.6	-	
		1995	10.16	411.6	15.3	9.6	9.6	8.2	2.9	Rate of berries: 52%
	Ruby King	1993	9.20	300.7	16.3	8.7	8.5	7.8	-	
		1994	10. 3	410.4	17.2	10.2	8.7	8.6	-	
		1995	10.16	461.9	15.3	9.9	9.9	8.5	3.0	Rate of berries: 47%

Table 2-5-40 (3) Characteristics of harvested fruits (1993～1995)

Kind	Variety	Year	Harvest date	Fruit weight g	Sugar content Brix	Fruit diameter I cm	Fruit diameter II cm	Fruit height cm	pH	Note
Peach	Takei Wase Hakuhoh	1993	6.22	125.0	14.7	6.8	6.5	6.0	-	
		1994	6.16	178.8	11.1	7.1	6.9	6.6	-	
		1995	6. 9	150.8	13.3	6.8	6.1	6.3	4.6	
	Yamafuji Hakuhoh	1993	7.23	101.8	13.2	5.9	5.9	5.8	-	
		1994	7.20	148.2	16.9	6.6	6.1	6.1	-	
		1995	7.17	186.9	13.7	7.2	6.7	6.6	4.6	
	Kurakata Wase	1993	7. 2	120.3	14.5	5.9	5.8	6.0	-	
		1994	6.21	103.5	12.6	5.7	5.3	5.8	-	
		1995	6.26	160.1	12.9	6.7	6.5	6.5	4.8	
	Akatsuki	1993	7.12	100.3	15.9	5.7	6.0	5.6	-	
		1994	7. 4	97.3	14.3	5.0	5.6	5.7	-	
		1995	7. 5	152.8	11.8	6.6	6.5	6.4	4.8	
	Hakuhoh	1993	7.19	117.6	17.9	6.1	6.0	5.9	-	
		1994	7. 7	112.9	15.8	5.7	5.7	5.5	-	
		1995	7.10	190.5	13.0	7.2	7.0	6.8	4.8	
	Kawanakajima Hakutoh	1993	8.16	185.8	15.4	6.7	6.8	6.3	-	
		1994	7.22	141.5	14.4	6.3	6.4	6.6	-	
		1995	7.20	258.5	13.6	8.1	7.8	7.4	4.7	
	Sunago Wase	1993	-	-	-	-	-	-	-	
		1994	6.28	123.3	17.7	5.8	5.8	6.0	-	
		1995	7.10	121.4	12.9	6.1	6.0	5.8	4.8	
	(Ohkubo) in error	1993	-	-	-	-	-	-	-	
		1994	7.25	133.6	13.8	6.4	6.4	6.5	-	Cling stone. Peak-headed
		1995	-	-	-	-	-	-	-	Weakened. fruits dropped all
	(Shuuhoh) in error	1993	-	-	-	-	-	-	-	
		1994	6.28	147.5	14.6	6.2	6.2	6.3	-	
		1995	7.10	173.9	12.5	6.8	6.8	6.3	4.8	

Table 2-5-40 (4) Characteristics of harvested fruits (1993～1995)

Kind	Variety	Year	Harvest date	Fruit weight g	Sugar content Brix	Fruit diameter I cm	Fruit diameter II cm	Fruit height cm	pH	Note
Persimmon	Nishimura Wase	1993	9.20	139.9	18.8	7.1	6.8	4.9	-	Seeds number: 4.9
		1994	9. 9	136.6	19.3	6.9	6.5	5.0	-	Seeds number: 1.3
		1995	10. 5	179.5	20.1	7.6	7.6	5.0	5.9	Seeds number: 1.6
	Izu	1993	11. 8	157.0	20.0	7.2	7.2	5.4	-	Seeds number: 4.0
		1994	9.20	143.3	16.4	7.1	6.8	4.9	-	Seeds number: 3.2
		1995	10.23	195.1	18.7	7.7	7.7	5.4	-	Seeds number: 1.4
	Hiratanenashi	1993	11. 8	151.7	23.2	7.1	7.6	5.0	-	
		1994	10. 3	130.4	19.2	6.8	6.5	4.5	-	
		1995	10.23	151.1	19.4	7.0	7.0	4.6	5.8	
	Saefuji	1993	11. 8	99.0	24.0	5.4	5.4	6.7	-	Pollination variant variety
		1994	9.20	77.3	19.9	4.7	4.5	5.5	-	
		1995	10.27	103.4	21.8	5.4	5.4	6.6	-	Seeds number: 5.0
	Fuyuu	1993	11.19	146.2	18.4	6.8	6.8	4.6	-	Seeds number: 5.4
		1994	10.31	144.3	18.1	5.9	5.2	4.1	-	
		1995	10.30	189.4	18.1	7.3	7.3	5.6	5.8	Seeds number: 4.3
	Matsumoto Wase Fuyuu	1993	11.19	122.6	17.7	6.0	6.0	4.1	-	Seeds number: 5.1
		1994	10.31	131.8	17.3	5.5	4.8	4.0	-	
		1995	11.15	227.6	20.9	7.7	7.7	6.0	5.8	Seeds number: 2.2
	Kohshuu Hyakume	1995	11.16	278.8	20.1	7.8	7.8	8.4	5.6	Seeds number: 3.4
	Ohtanenashi	1995	11.16	289.0	20.3	8.7	8.7	5.9	6.0	
	Saijoh	1995	10.23	54.4	22.3	4.0	4.0	5.2	-	Survey on dropped fruit by wind
	Mikado	1995	11. 1	265.9	18.3	8.0	8.0	6.7	5.8	Seeds number: 1.9
Apricot	Niigata Ohmi	1993	6. 7	44.9	15.4	4.5	4.4	4.6	-	
		1994	6. 2	30.1	14.8	3.7	3.8	4.0	-	
		1995	5.29	43.0	14.8	3.8	3.9	3.9	3.6	
	Heiwa	1993	6. 7	57.8	11.7	4.7	4.5	5.0	-	
		1994	6. 2	29.9	14.3	3.6	3.2	3.9	-	
		1995	5.29	39.6	11.4	3.8	3.5	4.0	3.5	

Table 2-5-40 (5) Characteristics of harvested fruits (1993～1995)

Kind	Variety	Year	Harvest date	Fruit weight g	Sugar content Brix	Fruit diameter I cm	Fruit diameter II cm	Fruit height cm	pH	Note
Plum	Oh-ishi Nakate	1993	6.25	49.1	14.3	4.5	4.4	4.6	-	
		1994	6. 9	45.2	14.3	4.4	4.2	4.4	-	
		1995	6. 5	64.9	15.1	4.7	4.7	4.9	5.3	
	Inoue	1993	6.25	39.6	17.2	4.0	4.0	4.3	-	
		1994	6. 9	31.8	17.4	3.6	3.4	4.0	-	
		1995	6. 5	37.9	12.2	4.0	3.8	4.3	4.3	
	Sir Prise	1995	6. 5	46.0	11.7	4.3	4.1	4.5	5.1	First fruiting
	Santa Rosa	1993	6.28	69.4	15.3	4.7	4.7	4.9	-	
		1994	6.17	47.4	14.3	4.2	4.2	4.5	-	
		1995	6.21	51.3	11.5	4.4	4.3	4.5	3.5	
	Taiyoh	1994	6.17	27.0	16.4	3.5	3.1	3.7	-	First fruiting
		1995	7.10	39.8	16.0	4.0	4.0	4.3	3.7	
Apple	Stark Earliest	1993	6.23	139.9	15.0	7.5	7.5	5.9	-	
		1994	6.23	132.1	13.8	7.4	7.4	5.7	-	
		1995	6.15	121.5	12.2	7.0	7.0	5.5	3.1	
	Anna	1993	7.10	162.6	14.6	7.1	6.7	7.1	-	
		1994	7.11	171.2	13.0	7.1	7.1	7.7	-	
		1995	7.17	201.2	12.8	7.2	7.2	8.0	3.3	
	Tsugaru	1993	-	-	-	-	-	-	-	Unfruited yet
		1994	8. 3	201.9	18.2	8.1	7.9	6.7	-	
		1995	8. 7	191.4	16.4	7.9	7.9	6.5	3.8	
	Fuji	1993	-	-	-	-	-	-	-	Unfruited yet
		1994	10.31	170.4	19.2	7.5	7.1	6.3	-	
		1995	10.16	206.7	16.1	7.8	7.8	6.4	3.9	

Table 2-5-40 (6) Characteristics of harvested fruits (1993～1995)

Kind	Variety	Year	Harvest date	Fruit weight g	Sugar content Brix	Fruit diameter I cm	Fruit diameter II cm	Fruit height cm	pH	Note
Japanese Pear	Tama	1993	7.26	203.5	14.7	7.4	7.2	6.4	-	
		1994	8. 1	247.5	15.8	7.7	7.4	6.7	-	
		1995	7.24	225.0	13.2	7.6	7.6	6.6	4.8	Degree of hardness: 3.5kg
	Kohsui	1993	8.16	200.1	14.4	7.4	7.3	6.3	-	
		1994	8. 8	209.2	15.2	7.3	7.2	6.1	-	
		1995	8. 8	233.5	13.6	7.5	7.5	6.8	5.1	Degree of hardness: 2.8kg
	Hohsui	1993	8.19	217.5	14.4	7.5	7.4	6.9	-	
		1994	8.17	239.5	14.7	7.8	7.4	7.0	-	
		1995	8.14	256.8	14.7	7.6	7.6	7.3	4.8	Degree of hardness: 2.7kg
	Shinsui	1993	-	-	-	-	-	-	-	Unfruited yet
		1994	8. 8	192.9	16.7	7.2	7.0	6.4	-	
		1995	8.18	197.2	15.8	7.2	7.2	6.4	5.1	Degree of hardness: 2.4kg
	Nijisseiki	1993	8.31	175.0	16.2	7.1	6.8	6.3	-	
		1994	8.23	216.8	16.3	7.7	7.4	7.0	-	
		1995	8.21	168.4	14.7	6.8	6.8	6.0	4.4	Degree of hardness: 3.9kg
	Osa Nijisseiki	1993	9. 1	203.1	14.8	7.3	7.0	6.5	-	
		1994	8.23	250.6	15.2	7.9	7.7	7.4	-	
		1995	9. 4	229.5	13.9	7.6	7.6	6.7	4.8	Degree of hardness: 2.8kg
	Shinsei	1993	-	-	-	-	-	-	-	Unfruited yet
		1994	9.12	278.5	15.7	8.0	7.9	7.9	-	
		1995	9. 4	241.7	16.3	7.6	7.6	7.4	5.1	Degree of hardness: 3.3kg

Among 11 kinds of trial planted fruits, 9 kinds of fruits excepting Sweet Cherry (Prunus avium) and Apricot (Prunus Armeniaca) have no any problem on fruiting and its maturity and, they seem to realizetheir original characteristics by aging of fruit bearing tree. However, Fig (Ficus carica) is a fruiting tree that the fruits of it mature by turns from lower branches to upper branches spending 2 months or more from the middle of July, and it has high speed of maturity due to high temperature, so that the fruits rapidly reduced their commercial value because that they become overmature in short time even if the fruits picked on every other day or on every third day. For trial, the fruits are served to a market in Adana in several times, but a disposal rate was quite high because of no commercial value in every time, therefore the results were not satisfied. For making a countermeasure to solve this situation, earlier harvesting was tried, but the fruits were too hard in this case, so that they were not edible. On varieties brought into from Japan, there is no time to harvest as to be able to serve to markets in this high temperature area. Therefore, these fruits are only for consumers who eat directly after harvesting at an edible mature stage. Turkish varieties that are produced domestically and selling in kiosks or bazaars in roads are well keeping their quality. Therefore, the 2 varieties called as Masui Dauphine and Kadota from Japan are no match for them.

Sweet Cherry (Prunus avium) and Apricot (Prunus Armeniaca) have 2 varieties each, but both of them yielded little fruits in 1994, and bearing fruits themselves were very small scale comparing with those bore in the previous year. Though a lot of flower buds observed in the previous year, actual flowering buds were quite little and resulted fruits themselves were also very small in this year. A cause of this may be short low temperature summation hours, but it can not be concluded yet at present. Meteorological condition in 1995 was a mild winter, so the flower buds of Sweet Cherry and Apricot were both well developed and there was no problem on number of flowering buds. This may be depended on good or poor pollination.

Kinds and varieties of fruits that can be considered to be good quality and have a bright future harvested with some volume in 1993 and 1994 are 2 varieties of Pear (Pyrus serotina var. culta) called as Nijisseiki and Tama. Bearing volume of Nijisseiki were rather high for their tree sizes, but their fruits were rather small. However, their sugar content had exceeded 16° , the sarcocarps of them were also good quality, so eating quality was quite good too. However, according to a result of questionnaire of sampling them to Turk, there were the pros and cons due to different quality of the sarcocarps with European Pear (Pyrus communis L.) (as mentioned hereinafter). The storage quality of Nijisseiki was not studied completely, so this will be a future task.

The variety of Tama matured from the end of July to August. Sugar content was some 15° , and its quality was also comparatively good as a variety of early maturation.

Fruits of a variety called as Nishimura Wase of a persimmon (Diospyros

Kaki) had a lot of seeds and were quite sweet in 1993, so it was considered that they would have a bright future at that time. However, those harvested in 1994 had a little seeds and their tastes were rather astringent. We regret to say that a defect of imperfect pollination variant of the Sweet Persimmon has appeared evidently. Further more, a lot of the fruits harvested in 1995 had also remained an astringent taste at near their calyx. Therefore, services to markets would not be able to make without treatment of removal of astringency.

A variety of Hiratanenashi had been get in 1993 and 1995 in a good store of produce as mentioned above as 112 kg and 273 kg respectively, so trials of removal of astringency by alcohol and cured persimmon were made. For removal of astringency, calyx of persimmon was firstly soaked in vodka containing 40% of alcohol content and secondly kept them air-tight in desiccator immediately after the soaking with room temperature (around 20 ℃) stationarily. After 5 days of the treatment, astringency of the persimmons was completely removed. The sarcocarp of the astringency removed persimmons became soft and quite sweet, so eating quality was quite good. However, the sarcocarp of them had become dehardening by 3 days more, in other words the keeping quality was not so good. For making cured persimmon, pericarp of harvested persimmons was removed by using knife and dried the pericarp removed persimmons by hanging on rods set in a place that gets the sun on it with threads. In 1993, it was fine days during the drying period, so the persimmons had dried in good softness for 5 days. In Japan, it is necessary to fumigate by sulfurous acid gas as a measure so that the sarcocarp of persimmons does not blacken by oxidation because that pericarp removed persimmons are easy to blacken. However, in our case this time, pericarp removed persimmons was completely dried up without any time to oxidize, so the products had a good tone of color and quality. On the other hand in 1995, it was nasty weather during the period for drying, so the fruits were blacken and became moldy because that those fruits had been left for a long time without drying with no sunlight given to them. As a result, the fruits became inedible. It means that the time for making cured persimmons should be decided considering the weather condition.

A variety of Japanese Plum (Prunus salicina Lindl.) called as Santa Rosa was not suffered damages from chlorosis, had been get in 1994 and 1995 in a good store of produce as 50 kg and 288 kg respectively in good quality in spite of small fruits, so makes us to expect commercialization in the future.

Varieties of Peach (Prunus persica) and Nectarine (Var. nucipersica) have also gradually increased of their fruiting volume, but they are hopeless during suffering damages from chlorosis. And, because of rapidly softening after the full maturation, the fruits should be harvested in early stage. But it is not cleared yet that the fruits harvested in early stage is adopted or not in markets, so commercialization trial should be executed to obtain information on people's taste.

Varieties of Apple (Malus pumila) called as Fuji and Tsugaru were born

Table 2-5-41 (1) Characteristics of harvested grape (1994, 1995)

Variety	Treatment of Gibberellin	Year	Harvest date	Length of cluster cm	Weight of cluster g	Berries number per cluster		Rate of seedless berries %	Average weight per berry	
						Seeded berry	Seedless berry		Seeded berry g	Seedless berry g
Kyohoh	Non	1994	7.22	14.5	175.4	26.0	2.0	7.2	6.7	2.4
		1995	7.25	13.7	320.1	37.8	0.1	0.5	8.4	1.8
Kyohoh	Done	1994	7.14	15.3	301.2	5.9	49.7	89.4	7.6	5.0
		1995	7.25	15.7	375.6	32.5	13.0	28.6	8.7	5.3
Kaiji	Non	1994	9. 1	14.5	262.7	59.3	3.2	5.1	4.7	1.9
		1995	9. 7	15.3	459.8	74.0	0.9	1.3	6.0	1.8
Hokkoh	Non	1994	9. 3	15.0	397.5	74.0	3.7	4.8	5.1	1.7
		1995	9.11	14.3	298.5	46.4	2.2	5.0	6.2	1.6

Note: Figures indicated above means the average of 10 clusters.

Table 2-5-41 (2) Characteristics of harvested grape (1994, 1995)

Variety	Treatment of Gibberellin	Year	Harvest date	Sugar content of juice Brix		pH of juice		Color of pericarp	Shape of berry	Removal easiness of pericarp	Flavor of sarcocarp
				Seeded berry	Seedless berry	Seeded berry	Seedless berry				
Kyohoh	Non	1994	7.22	21.1	21.7			Black	Short ellipse	Easy	Faint foxy
		1995	7.25	20.0	21.4	3.5	3.2	Black	Short ellipse	Easy	Faint foxy
Kyohoh	Done	1994	7.14	20.8	22.2			Black	Short ellipse	Easy	Faint foxy
		1995	7.25	19.7	21.6	3.3	3.3	Black	Short ellipse	Easy	Faint foxy
Kaiji	Non	1994	9. 1	26.3	26.5			Pale red	Oval	Difficult	Non
		1995	9. 7	19.9	20.4	4.0	4.3	Pale red	Oval	Difficult	Non
Hokkoh	Non	1994	9. 3	19.8	20.2			Black	Oval	Difficult	Non
		1995	9.11	19.4	20.0	4.4	4.5	Black	Oval	Difficult	Non

Note: Figures indicated above means the average of 10 clusters.

firstly in 1994, so the bearing times are only twice up to the present. Sugar content and acidity of them were proper and quality of sarcocarp was also compact moderately, so eating quality was good too. Particularly, fruits of Fuji as a late variety can be edible in early stage, and this will be a worthy of special mention for future commercialization. According the test results of fruits dropped caused by strong wind in the evening of September 28, 1995, the weight per fruit already exceeds 200 g and had 15.6° of sugar content and pH 3.9 of acidity in spite of 2 or 3 weeks earlier stage than the normal harvesting time between the middle and the end of October. They were not colored yet, but had become enough quality to be edible. This is to say that they will be able to harvest in early stage and can be served to markets for a long time. The most important thing is to secure flower setting, because that bearing volume depends on it. Varieties of apple called as Stark Earliest and Anna have started the flowering from early age of trees, and gradually increased their production and there was no any problem in fruit size, but their sugar contents are rather low as 12° .

Five varieties of Pomegranate (Punica granatum) have become to produce large fruits, their sugar contents were as moderately as around 15° and around pH 3 of acidity, so eating quality was quite good provided that the variety of California among them had a rather low berry formation rate of 39% comparing with others of around 50%. Up to 1994, there were no clacking, but there were clacking slightly in 1995 caused by rainfall in harvesting time. Therefore, if there is a sign of rainfall, harvesting should be execute in early time as a safety measure to harvest them.

Fruits' size of varieties of a Loquat (Eriobotrya Japonica) called as Mogi and Yuvarlak Cukur Gobek were comparatively large and their production volume was also static during these 3 years. However, the variety of Mogi had a high sugar content ranging from 11.2° to 15.4° , but the variety of Yuvarlak Cukur Gobek had a low sugar content ranging between 10.1 ° and 10.8° and had poor eating quality too. A variety of Tanaka had a sugar content ranging between 11.0° and 13.5° and had enough fruit's sizes, but it is easy to suffer damages from high temperature in harvesting season. Therefore, it is necessary to take countermeasure for proofing high temperature during maturity stage. The variety of Akko XII had a sugar content ranging between 11.0° and 14.1° and eating quality was good too. However, their fruits' sizes were small and easy to suffer damages from sun scald. The variety of Nagasaki Wase produced still a little in its production volume, so the characteristic detail is not cleared yet, but its fruit size was rather large and may be enough sweet, so it can be expected for commercialization in the future.

A variety of grape (Vitis L.) called as Kyohoh has shattering characteristic because it is a tetraploid variety, so usually branches should be spread out on a horizontal trellis so to stabilize their trees for setting seeded fruits. Treatment by gibberellin for flowering is generally taken as a countermeasure for improvement of the said characteristic. When this treatment is executed, fruit setting becomes

good and can produce seedless grape as an effect. In this study, branches could not be spread freely because that the cultivation is hedgerow training up to 1994, so that it was planned to increase production of their fruits and to produce seedless grape by gibberellin treatment. As a result, a weight of fruits without gibberellin was 175.4 g per bunch with 28 berries, but that with gibberellin became 301.2 g with 55 berries, and seedless rate was 89.4% which means almost of all berries to be seedless. A test was made by using horizontal trellis changed from the said hedgerow in the spring 1995 spreading branches on it and gibberellin treatment was made too for flowers. The bunch resulted from this trial without gibberellin treatment had 320.1 g of weight with 38 berries per bunch, and that with gibberellin treatment had 375.6 g with 45.5 berries per bunch in average and seedless rate was as low as 28.6%. It can be considered that the effect of gibberellin was difficult to realize because that the weather condition was in high temperature and in dried air at that time. It means that a bunch has enough number of setting of berries whether gibberellin treatment is made or not. So necessity of gibberellin treatment had become low. When seedless grapes are wished to produce, gibberellin treatment will be necessary, but seedless rate will become low because of high temperature and dry air in treatment time in this area. The fruits of the variety of Kyohoh have big berries with a little foxy smell and they have low acidity, so eating quality is good that maybe a Turkish taste. But they have a shattering habit as a problem. A variety called as Kaiji had set good quality of bunch after changing from hedgerow to horizontal trellis as 459.8 g in weight with 74 berries per bunch. A weight per berry was moderate as 6 g per berry with no any smelling but had low acidity, so eating quality was quite good with high sweetness. Originally, this variety has dark red of pericarp in cool condition of weather under direct sunlight, but it had become light red due to lack of the said condition this time because that the bunches were covered by paper bag for shading from the bright direct sunlight in young stage of berries and were kept to cover by this paper bag up to the maturity stage for protecting from bird injury, and a high temperature condition of weather was continued up to the beginning of September of harvesting stage. In the case that the variety of Kaiji has virus infectivity, sugar content sometimes can not become high and color of pericarp will come to light red. However, the specimen used this time for the test has high sugar content, so it may not say that the said result was not caused from virus infection. The variety of Hokkoh was grown from a seedling group of the variety of Kyohoh. The seedling of Hokkoh was maybe mixed in the Kyohoh's group of seedling. The variety of Hokkoh has originated from the variety of Kaiji as parent plant. It has pericarp of black color and is easy to color. So it was keeping with paper bag up to the harvesting stage, but fruits were colored up to completely purple black color with slight light color. Setting number of berries were still a little in a bunch, but eating quality was good.

2-5-4. Other Test for Fruit Trees in Demonstration Fruit Field

(1) Test on Extents of Fruit Thinning on Loquat

1) Purpose

To make sure to produce valuable fruits for marketing by fruits thinning of fruiting varieties from trial cultivation.

2) Test Method

The varieties that had been able to use as specimen for test in volume of bearing was used for specimen for the test, so the variety of Yuvarlak Çukur Gobek was used in 1994 and the varieties of Mogi and Tanaka were used in 1995 for the test.

The fruits thinning test was made by classifying into 5 blocks from 1 fruit leaving to 5 fruits leaving per cluster on March 20 when the time was just after 1 month from full flowering of Yuvarlak Çukur Gobek in 1994.

For the variety of Mogi and Tanaka, the said fruits thinning test was made by classifying into 3 classes from 2 fruits leaving to 4 fruits leaving per cluster on March 24 when the time was just after 1 month too from full flowering of them.

The tests were made for 10 clusters in each class.

Observation of bearing was made in harvesting stage, and made on their fruits' sizes. Provided that the variety of Tanaka could not be observed because of severe sun scald of fruits caused by remarkable high temperature as 41.3 ℃ of daily maximum temperature in harvesting stage of the end of May, 1995.

3) Test Results

The result of fruit thinning test for Yuvarlak Çukur Gobek is shown in Table 2-5-42.

Table 2-5-42 Result of fruit thinning test(1994) on loquat "Yuvarlak Çukur Gobek"

Fruits number per cluster	Weight of Fruit g	Weight of cluster g	Size of Fruit	
			Length cm	Width cm
1	44.2	44.2	4.6	4.2
2	35.6	71.2	4.1	3.9
3	34.0	102.0	3.8	3.9
4	27.7	110.8	3.8	3.6
5	22.8	114.0	3.3	3.5

Note: Figures indicated above means the average of 10 fruits.

In the case of 2 fruits leaving class and 3 fruits leaving class, the weight of fruit was 35.6 g and 34.0 g respectively that show a good growing. The case of 1 fruit leaving class shows that the fruit weight was 44.2 g

which was excellent one. On the other hand, in the case of 4 fruits leaving class and 5 fruits leaving class, the weight of fruits was 27.7 g and 22.8 g respectively. These results were rather poor comparing with others.

The weight of fruit in the case of 3 fruits leaving class was slightly heavier than that in the case of 2 fruits leaving class. The difference was very small as 1.6 g between them, so the 3 fruits leaving class has an advantage on the viewpoint of commercial basis. By comparing weight per fruit, the weight per fruit in the 1 fruit leaving class was 30% heavier than that in the 3 fruits leaving class, but total weight in the 1 fruit leaving class was 57% lower weight than the total weight of 3 fruits leaving class. The fruits in 1 fruit leaving classes has better quality in size and good looks, so it can price them at higher amount than in 3 fruits leaving class. In this case, the price for fruits in 1 fruit leaving class should be double of that in 3 fruits leaving class on the viewpoint of commercial basis. In the case of comparing with the case of 4 fruits leaving class, selling amount of fruits in the 4 fruits leaving class will be higher than in the case of 3 fruits leaving class when price of fruits is set at more than 8% drop from the price in the case of 3 fruits leaving class. Furthermore, selling amount in the case 5 fruits leaving class will be higher than in the case of 3 fruits leaving class when the price of fruits in the case of 5 fruits leaving class is set at more than 11% drop from the price in the case of 3 fruits leaving class. However, considering availability price in the markets, fruit thinning for 3 fruits leaving is recommendable choice in this case.

The result of fruit thinning test for Mogi is shown in Table 2-5-43.

Table 2-5-43 Result of fruit thinning test(1995) on loquat "Mogi"

Fruits number per cluster	Weight of Fruit g	Weight of cluster g	Size of Fruit	
			Length cm	Width cm
2	31.1	62.2	5.4	3.5
3	29.9	89.7	5.2	3.2
4	25.5	102.0	4.8	3.0

Note: Figures indicated above means the average of 10 fruits.

In the case of 2 fruits leaving class and 3 fruits leaving class, the weight per fruit was 31.1 g and 29.9 g respectively with difference of only 1.2 g, and both of them showed good growing results. On the other hand the weight per fruit was 25.5 g in the case of 4 fruits leaving class indicated that the weight was 4.4 g less than that in the case of 3 fruits leaving class. Namely, the weight per fruit in the case of 4 fruits leaving class was 15% lower than that in the case of 3 fruits leaving class. In total weight per bunch, the bunch in the case of 4 fruits leaving class was heavier as 14% in percentage than that in the case of 3 fruits leaving class, However, commercial price of fruits in the case of 4 fruits leaving class may be more decreased than that percentage. Therefore, the fruit

thinning in the case 3 fruits leaving class will be the best choice for commercialization in Mogi case too.

Finally, the fruit thinning test gave a result that the case of 3 fruits leaving class will be the best choice for the fruit size in moderate in both the cases of Yuvarlak Cukur Gobek and Mogi. For the variety of Tanaka, the fruit thinning test could not make this time due to the above mentioned reason, but it would be resulted a different decision because of its variety of large size fruit.

(2) Test on Bagging Cultivation

1) Purpose

To make sure effects of paper bagging for fruits on trees for protecting damages caused by the bright sunlight and/or strong wind, or from injurious insects and so on.

2) Test Methods

a. Apple

A variety of Stark Earliest was used as specimen. A bagging was made on May 20, 1995, 1 month after the flowering, using paper bags made of light blue colored wax paper, for the half of total bearing. The remaining half of bearing was left without bagging. These paper bags brought from Japan, specially made for fruits' cultivation, are provided with fastener on its opening for fastening on fruit, so it is easy to bag on fruit. The bagged fruits were left until their harvesting as they are.

b. Peach

Varieties called as Kurakata Wase, Akatsuki, Hakuhoh, Yamafuji Hakuhoh, and Kawanakajima Hakutoh were used as specimens. White bags with 14 cm x 18 cm in size, inside color of black and fastener on their openings too usually used in Japan were used for the test. The bagging was made on May 10, 1995. When the covered fruits are left until harvesting stage, the fruits can not be colored. Therefore, the bags were removed when the fruits had colored lightly and it is appeared to us to be on the verge of harvesting around 5 or 6 days thereafter.

c. Pear

The Japanese Pear has 2 kinds as Red pear and Green pear based on their pericarp color. The varieties of Shinsui, Kohsui, Kohsui and Shinsei are classified as Red pear and, the varieties of Nijisseiki, Osa Nijisseiki, and Tama are classified as Green pear. The Red pear has brown colored corked spot on the surface of their pericarp, so the fruit's color is like brownish red. Therefore, single wax paper bags were used for test for Red pear because that appearance of their fruits' surface is no

necessary to so worry severely. And for the Green pears, double paper bags with wax paper and ordinary paper were used for keeping fruit's surface to clear because that the Green pear is easy to become ugly their appearance of their surface (this is a common method in Japan). Fruits covered by bags were left until their harvesting.

d. Grape

The varieties of Kaiji and Kyohoh were used for the test. The bagging was made on June 11 and 12, 1995, with 2 kinds of bags, i.e. the one was made of white colored sulfite brown paper sized as 20 cm x 28 cm, and the other one was made of news paper with the same size. Fruits covered by bags were left until their harvesting.

3) Test Results

a. Apple

Maturity time of the variety of Stark Earliest is in the middle of summer season. Therefore, bagged fruits were suffered heavier damages of sun scald inside of the bags due to high temperature in summer season than that of non-bagged fruits as was expected that Adana was the area of high temperature.

The test result after harvesting of fruits is shown in Table 2-5-44.

Table 2-5-44 Result of bagging culture test(1994) on apple "Stark Earliest"

Bagging to Fruits	Weight of Fruit g	Size of Fruit		Sugar content Brix	pH of juice
		Length cm	Width cm		
Done	153.8	5.9	7.9	14.0	3.0
None	132.1	5.7	7.4	13.8	3.1

Note: Figures indicated above means the average of 10 fruits.

Results of bagged fruits and non-bagged fruits were almost the same except that bagged fruits were colored lightly on their pericarp and slightly larger size than the others.

According the said results, bagging for protecting fruit's surface had appeared a little effect but brought damages of sun scald rather than non-bagging, so it will be no necessary to bag to the variety of Stark Earliest.

b. Peach

There were no damages from direct sunlight because used bags made of paper with no light-admitting quality, and could get coloring on fruits' surface by removal of bags immediately before harvesting in the maturity stage, so the fruits got a value for commercialization. Usually, the bagging is made for protecting damages from injurious insects as a

purpose as mentioned above. In the case of early maturity varieties, there was no damages from the said injurious insects, so it is no necessary to express on effects of bagging. However, in the case of the latest maturity variety as Kawanakajima Hakutoh, bagged fruits were not suffered damages, but non-bagged fruits had been suffered damages from Mediterranean fruit-fly (Ceratitis capitata Wied) for all bearings so there were no any fruits produced. In this area, there is a little injurious insect comparatively. However, it appears us firstly that the bagging has an effect for protecting damages from injurious insects.

The test results of harvested fruits are shown in Table 2-5-45.

Table 2-5-45 Result of bagging culture test(1994) on Japanese peach

Variety	Bagging of Fruits	Weight of Fruit g	Size of Fruit		Sugar content juice Brix
			Length cm	Width cm	
Kurakata Wase	Done	108.8	5.8	5.5	12.6
	None	103.5	5.8	5.5	12.6
Akatsuki	Done	101.6	5.9	5.7	13.3
	None	97.3	5.7	5.3	14.3
Hakuhoh	Done	124.1	6.1	6.1	12.2
	None	112.9	5.5	5.7	15.8
Yamafuji Hakuhoh	Done	167.5	6.5	6.7	13.9
	None	148.o	6. 1	6.4	16.9
Kawanakajima Hakutoh	Done	208.0	7.4	7.2	14.0
	None	141.5	6.6	6.3	14.4

Note: Figures indicated above means the average of 10 fruits.

In the case of the variety of Kurakata Wase, there was no effects on size and sweetness of fruits except their appearance of their surface that is one of effects of bagging. In Akatsuki's case, the weight of fruits was increased by 4% but decreased by 1° of sugar content but no influence to the eating quality because the decreased sugar content was 13.3° in average, and their appearances were so good because of clean surface of them. In the case of Hakuhoh, the weight of fruits had increased by 10% so grown well, but their sugar content had decreased by 3.6° . However, the eating quality was rather good because that the decreased sugar content was 12.2° in average. It may say that the commercial value of them was increased due to good appearance of their surface and their large size. In the case of Yamafuji Hakuhoh, the weight of fruits had increased by 13% but its sugar content had decreased by 3° . Expression of Yamafuji Hakuhoh is almost the same with Hakuhoh's case. In the case of Kawanakajima Hakutoh, the weight of fruits had increased remarkably by 46% and sugar content was no changed. It may say that the bagging had a quite good effect together with the effect for protecting damages from injurious insects as mentioned above.

c. Pear

The young fruits the Red pear was suffered damages from sun scald by direct sunlight and high temperature immediately after bagging by bags made of light blue colored wax paper. But the damages were not so severe, so production volume was not so much influenced. Double papers' bags used for the Green pears could shade sunlight well, so had kept pericarp to be clean as well as could protect damage well from Mediterranean fruit-fly. The bagging for the variety of Nijisseiki in Japan usually realizes to protect damages from the black spot that is occurred frequently, the said disease did not occur in this field whether bagging or not.

d. Grape

The white colored bags made for grapes can admit the sunlight a little, so Kyohoh and Hokkoh that are the varieties to be easy to colored were colored well. However, in the case of the variety of Kaiji that can be colored by direct sunlight only, the bagging had disturbed to be colored, so coloring of fruits was quite lightly. Bags made by newspaper has poorer sunlight admittance than that of ordinary white papers, so had shown more disturbance for coloring.

Because that there is no any vineyard field near here, fruits' bunches were suffered a lot of damages from birds in the maturity season. The bunches covered by white paper bags were not suffered damages from birds, but that covered by bags made by newspaper were seriously damaged by eating in the part of hedge of the bags because that the paper bags had softened immediately after the rainfall. Therefore, it is necessary to use bags made of white paper for producing satisfied fruits from this kind of fields and should be left until the harvesting time. In the case of variety of Kaiji, the bags should be removed for taking the direct sunlight in the maturity season, so that it should be found out a countermeasure for keeping birds away from the fields. At the present time, there is no such an effective countermeasure for keeping birds away. Therefore, it had been better to leave with bagging until the harvesting season even that the coloring would become poor.

(3) Study of Tastes for Japanese Fruits

1) Purpose

To make sure an acceptability for Japanese fruits in Turkey when the varieties of Japanese fruits show a feasibility to cultivate here.

2) Teat Method

An interview survey to ordinary consumers was made using questionnaire sheets to write down on it their impressions after serving several Japanese fruits as the Japanese varieties of Pear called as Nijisseiki, Kohsui and

Hohsui, the variety of Nishimura Wase of Persimmon, the variety of Kawanakajima Hakutoh of Peach, and the variety of Kyohoh of Grape.

3) Test Results

a. Nijisseiki (Japanese Pear)

The interview survey was made for 24 persons from TIGEM Cukurova Estate and 2 persons from city bank consisting of male of 22 persons and female of 4 persons. The result is shown in Table 2-5-46.

Table 2-5-46 Result of interview survey by trial eating of Nijisseiki pear(1993)

Item	Excellent	Very good	Good	No good	Poor
Shape of fruits	3	6	3	14	0
Color of pericarp	4	9	11	1	1
Eating quality	6	12	6	1	1
Sugar content	5	6	12	2	1
Acidity	4	5	12	5	0
Impression if compared with domestic ones	2	6	10	5	3

(Several impressions written down)

- Be juicy.
- Not like pear because that the shape is different from domestic pears.
- Turn sour according as to be near to seeds.
- Sarcocarp does not melt in mouth.
- The shape is like an apple.
- It has been better if more sugar content be contained.
- Be crisper than domestic ones.
- Be smart in shape.
- Be novel in hardness of pericarp and high water content.
- Be very sweet.
- Be novel in taste.
- Be roundish and hard.
- It has been better to be sweet more.

Answers of "excellent" and "very good" for shapes of Pear were taken from 9 persons among 26 persons, and "no good" was taken from 14 persons. It means that impressions have reflected their strange feeling against Japanese roundish pear like an apple because that they usually eat European pears shaped as a bottle. On the yellowish color of pericarp keeping smoothly by bagging, the answers of "no good" and "poor" were taken from one person each, "good" was taken from 11 persons, and answers of "very good" and "excellent" were taken from 13 persons in total. Therefore, almost of all persons have good impression for the color. On eating quality, the answers of "very good" and "excellent" had reached by 18 persons, it means that about 75% of the people have a favorable feature image for eating quality. For sugar content and acidity, the result shows the same tendency with the eating quality.

On the synthetic impression for the Japanese pears compared with the domestic pears, the persons who had no specific opinions expressed as "good" were 10 persons with 38% to the total persons, and remaining persons of 68% were classified into the same sized 2 groups consisting of a positive impression group and a negative impression group. It can be said roughly that the one third of the total persons had positive impressions, the other one third had no specific impressions, and remaining one third had a negative impression as a conclusion.

b. Kohsui (Japanese Pear)

The interview survey was made by trial eating for 12 persons introduced by JETRO Office in Istanbul. The result is shown in Table 2-5-47.

Table 2-5-47 Result of interview survey by trial eating of Kohsui pear(1994)

Item	Excellent	Very good	Good	No good	Poor
Shape of fruits	2	3	1	6	0
Color of pericarp	0	2	6	4	0
Eating quality	3	5	4	0	0
Sugar content	4	3	2	2	1
Acidity	4	1	6	1	0
Impression if compared with domestic ones	0	4	3	5	0

(Several impressions written down)

- Appearance is no good, but eating quality is excellent.
- The shape is like apple but not pear.
- The shape is strange, and taste is like an apple.
- The shape is novel, and has a little sugar content and no smelling.
- The eating quality is no good due to little sugar content.
- Has no smelling.
- Be feeling weaker in taste than that produced in Japan (who has been in Japan).
- Be interesting in the shape.
  (She is breeding a bird and usually gives it a domestic pear as a feed. She said that she tried to give it Japanese pear yesterday night, but the bird did not show any interest in it.)

The result of the interview survey by questionnaire shows almost the same impression with the case of the variety of Nijisseiki that almost of 25% of the people to total persons had impressions in the case of European pears, and a half group of remaining persons had positive impressions and the other half of remaining persons had negative impressions.

Showing no interest not only of human being but also of a bird in Japanese pear may be said to be short of smell of the fruit. It can surely be said that the Japanese pear has less smell than the European pears. But Japanese pear has enough high sugar content as 16° so it should be sweet, but there was an answer as "not sweet". Maybe, there were some ones with low sugar content mixed in the sample pears.

A synthetic impression in this group was rather negative after trial eating of the variety of Kohsui as a whole.

c. Hohsui (Japanese Pear)

The survey was made for 24 persons including male and female of staffs of TIGEM Cukurova by trial eating and questionnaire. The result is shown in Table 2-5-48.

Table 2-5-48 Result of interview survey by trial eating of Hohsui pear(1994)

Item	Excellent	Very good	Good	No good	Poor
Shape of fruits	7	10	5	2	0
Color of pericarp	5	7	10	2	0
Eating quality	5	12	6	1	0
Sugar content	4	5	12	3	0
Acidity	1	1	21	1	0
Impression if compared with domestic ones	2	9	7	5	1

(Several impressions written down)

- The shape is like an apple. Be juicy. Color of pericarp of the fruit is like mustard. The taste is like a kiwi fruit. The weight of the fruit is very heavy. The bigger, the better. Wish to test more.
- Be very sweet and fit to me. Does not cling to teeth. Does not cloy us to eat, so can eat it much. Be sweet very much and wonderful fruit it is. It is in our favour. Wish to produce more.
- Be strange and sweet.
- Be good in sweetness, hardness and it's shape.
- Be good in juicy and it's shape of roundish, and novel in hardness of sarcocarp.
- Be good in juicy, but no good in hardness of sarcocarp.
- Has more sarcocarp than the domestic ones.
- Has less sugar content than the domestic ones, the shape is like an apple. Does not melt in mouth but is juicy very much.
- The good taste leave in mouth when do not know what it is, but is poorer taste than the domestic ones when we know it is a pear.
- It may be good for diabetics. May be able to be transported. But, be inferior to the domestic variety of Haci Ahmet.
- The shape is completely different with the domestic ones. Roundish shape is like an apple. Be nice to look at the color of pericarp and it's pattern.
- Be anxious about the hardness of pericarp and sarcocarp. Has high sugar content but little acidity.
- Be crispy with sour. The softer in pericarp, the better.

On the variety of Hohsui, the total answers in impression as "excellent" and "very good" were resulted as 17 persons with 70% to the total persons in the fruit's shape and eating quality. And, the result shows as 78% in positive impressions from neutral impression as "good"

in items of the pericarp color, sugar content and acidity in addition to the said items, and negative impressions were very little. Among the varieties of Japanese pears, Hohsui had shown the best acceptability with positive impression of Turk.

d. Nishimura Wase Persimmon

This variety is an imperfect pollination variant of the Sweet Persimmons, the fruits were produced without any astringency as same as a perfect pollination of the Sweet Persimmons with enough seeds under the good pollination condition due to fine weather in the flowering season in 1993. Therefore, these fruits were used for trial eating served to staffs of TIGEM Cukurova. The result is shown in Table 2-5-49.

Table 2-5-49 Result of interview survey by trial eating of Nishimura Wase persimmon (1993)

Item	Excellent	Very good	Good	No good	Poor
Shape of fruits	0	4	7	4	0
Color of pericarp	2	5	8	0	0
Eating quality	2	4	9	0	0
Sugar content	2	5	8	0	0
Acidity	0	0	15	0	0
Impression if compared with domestic ones	1	2	9	3	0

(Several impressions written down)

- The fruit's size is small. It may be unripe because that it is still hard. It may become more sweet after ripening due to be more juicy.
- Domestic ones produced in Kahramanmaras are fitter us in taste than the Japanese persimmon. It may be unripe because that it is still hard.
- (There were a lot of impressions written down that the variety of Nishimura Wase to be served as specimen was still unripe.)
- There is no astringency. The seed's shape is strange.
- The taste is as "the seed-persimmon" (there may be such kind of imperfect pollination variant of the sweet persimmons as called "the seed-persimmons" in Turkey), but there is no astringency.

There are some varieties of persimmons in Turkey too. Therefore, the comparison was comparatively easy to be made, and their assessment for the Japanese persimmons were rather good. The negative impression under the neutral impression expressed as "good" were expressed by 4 persons with 24% for the fruits' shapes. The variety of Nishimura Wase is rather flat, but the domestic ones are almost roundish. So that this Japanese variety might be strange for them.

There were a lot of indication that the Japanese persimmons were still unripe. The persimmons that are proper mature in Japan are generally felt

by them as are unripe. The domestic persimmons sold in Adana city are almost softened ones. These domestic ones are the imperfect pollination variant, so that they usually wait to eat until softening time resulting in naturally removing the astringency. Furthermore, the astringent persimmons are only eaten by them at the time of complete softening of the fruits, and they do not remove the astringency artificially. Therefore, they do not know well the persimmons that are hard in sarcocarp but already mature. For making persimmons to fit them, it will be necessary to keep in storage until softening to serve them to eat in the year in case that the variety of Nishimura Wase has been produced with little seed ones. However, it is nonsense to introduce the Japanese persimmons to them. We wish to them to know the real taste of persimmons before the softening.

e. Kawanakajima Hakutoh (Japanese Peach)

The bagging was made at the end of May, and the bags were removed before 5 days of harvesting to take the direct sunlight for coloring. These fruits were served to staffs of TIGEM Cukurova for trial eating. The result is shown in Table 2-5-50.

Table 2-5-50 Result of interview survey by trial eating of Kawanakajima Hakutoh peach(1995)

Item	Excellent	Very good	Good	No good	Poor
Shape of fruits	10	7	0	0	0
Color of pericarp	9	8	0	0	0
Eating quality	5	8	4	0	0
Sugar content	6	9	2	0	0
Acidity	7	9	1	0	0
Impression if compared with domestic ones	0	12	5	0	0

(Several impressions written down)

- Be juicy and easy to remove its pericarp, and the shape is good.
- Be easy to remove seeds from sarcocarp.
- It's color and the shape are very good. It will become leading ones among summer fruits (among the varieties of Peach) in Turkey.
- Be uneasy to remove its pericarp from the sarcocarp comparing with the variety of Bursa Yalma Peach, but it can be expected it's commercialization.
- Size of the fruit is normally.
- To be uneasy to remove pericarp is no good, but it is good to be juicy.
- Be uneasy to remove pericarp, but juicy.
- Be easy to remove pericarp, but seeds are uneasy to remove at 5%.
- Be necessary to wash well because of it's trichome.
- Seeds are uneasy to remove from sarcocarp, so that about 3% of sarcocarp are loss because of sarcocarp left around the seeds.

Positive impressions were taken from all of the persons in all the 5 items of fruit's shape, color of pericarp, eating quality, sugar content

and acidity. Especially, all persons answered as "excellent" and "very good" in the items of fruit's shape and color of pericarp. It means that the beautiful fruits could be served for them due to making fruit thinning and bagging which are very laborious works, ordering the fruit's shape, and controlling of appearance of surface and coloring. It might be the different answers when a different cultivation was made as labour saving culture. In any case, the good impressions in the eating quality, the sugar content and the acidity mean that the variety of Kawanakajima Hakutoh is fit Turkish persons. Accordingly, almost 80% of the persons gave us answers as "very good" even comparing with the domestic ones. Therefore, it may be expected that the Japanese peach as a white color sarcocarp variety will hold as advantageous position in markets in Turkey that has been led by the variety of yellowish color sarcocarp of peach.

f. Kyohoh (Grape)

It was planned to serve seedless grape with gibberellin treatment for flowers at the flowering stage. However, the flowering stage in 1995 had started with weather of high temperature and dry air, so that the effect of gibberellin treatment did not realize completely. Therefore, produced fruits consisting of 30% of seedless and 70% of seed grape were served to 16 staffs of TIGEM Cukurova. The result is shown in Table 2-5-51.

Table 2-5-51 Result of interview survey by trial eating of Kyohoh grape (1995)

Item	Excellent	Very good	Good	No good	Poor
Shape of bunch	1	12	3	0	0
Size of bunch	3	8	5	0	0
Shape of berries	7	7	1	1	0
Size of a berry	6	7	2	1	0
Color of pericarp	4	10	1	1	0
Thickness of pericarp	0	0	3	10	3
Color of sarcocarp	6	7	3	0	0
Eating quality	7	6	3	0	0
Smell	6	6	2	2	0
Sugar content	9	5	2	0	0
Acidity	7	2	7	0	0
Impression if compared with domestic ones	0	7	9	0	0

(Several impressions written down)

- Be good in both of the appearance, the taste, and the smell. pericarp is too thick and seeds are too big (there were a lot of answers like these impressions).
- Be generally good.
- The appearance is good, but little sour.
- Be generally good except thickness of pericarp.
- Size of berry is rather large. It will be better for eating if pericarp is thinner, the size of berry is normal, and size of seeds is smaller.
- The pericarp is rather thick, but condition is generally good.
- Be generally good. Location of seeds is rather good. There is

astringency but little.

- Berries are easy to remove from their bunch. Sizes of seeds are not uniform and rather big. There leaves a little astringency in mouth.
- Size of seeds is quite big. The taste is normal.
- Size of seeds is rather big. Smell is like wine. Sizes of bunch and berries are good.
- It may hold a specific position among the domestic black colored grape. Be interesting in a strange smell and size of berries, and black color without gloss too.
- It may use for both direct eating and making wine. It may also have a feasibility for commercialization if it can be produce seedless ones.
- Be good for direct eating. Pericarp of berries is rather thick. Berries are easy to remove. Be wondering for making wine.

Almost of all persons had assessed on the shape and size of bunches as "very good" and "excellent", and on the color of pericarp as "good" or no any problem, but on thickness of pericarp as "no good" or "poor" concentrated to. The eating quality was tends to positive impressions on both the color and taste. Major group of the persons had assessed on the smell, the sugar content and the acidity as "very good" and "excellent". They were favorable to its light foxy smell as Japanese as are favorable to. There were a lot of indications in their impressions written down that size of seeds in addition to thickness of pericarp. This can be expected to improve by establishment of gibberellin treatment to make sure to realize it's effect. (We already have developed a practical cultivation method on seedless grape in Japan).

In synthetic assessment comparing with the domestic ones, they were favorable to Japanese grape as "very good" and "excellent". Therefore, the Japanese variety of grape would be fitter them where the grapes would be seedless ones.

However, one problem we have that the berries to be easy to remove from pedicle will be very difficult to improve.

(4) Storage Test on Nijisseiki Pear

1) Purpose

The variety of Nijisseiki pear is storable in Japan. Therefore, a storage test was made to make sure to postpone their forwarding to markets by storage in Turkey too.

2) Test Method

Fruits early harvest in August 23 and normally harvested in September 12 were used as specimen in 1994, and these normally harvested in September 1 were used as specimen in 1995 for the storage test.

The harvested specimen had entered into wooden boxes aligning in, and

immediately after this, the storage was started in storage house with keeping in temperature between 5℃ and 7℃. The storage house can be regulated in humidity of 80% constantly, so that did so.

Stored specimen had been observed in every 2 week for specimen harvested in 1994, and weekly for the specimen harvest in 1995 one by one as a sample.

In this case, a different variety called as Osa Nijisseiki was served too to the storage test in 1995, because generally speaking that this variety is not so much different quality with the variety of Nijisseiki except a good self-pollination in cultivation.

3) Test Results

The test result for the specimen harvest in 1994 is shown in Table 2-5-52.

Table 2-5-52 Result of storage test of Nijisseiki pear (1994)

Harvest date	Observed date	Duration from storage started days	Weight per fruit g	Sugar content Brix	Acidity pH	Hardness kg	Eating quality *
8.23	8.30	7	223.5	14.2	4.7	5.5	++++
	9.14	22	216.7	13.6	4.7	5.2	++++
	9.28	36	196.8	14.1	4.8	5.4	++++
	10.12	50	205.5	14.6	4.7	4.6	++++
	10.26	64	215.0	13.2	4.8	4.3	++++
	11.16	85	204.7	14.0	4.9	3.8	+++
	11.30	99	201.0	13.8	5.0	3.3	+++
	12.22	121	193.5	13.0	5.2	3.1	++
	12.28	129	194.4	13.6	5.3	2.8	+
9.12	9.14	2	228.2	16.0	4.8	4.4	++++
	9.28	16	194,5	15.0	4.9	4.0	++++
	10.12	30	189.5	14.2	4.8	3.8	++++
	10.26	44	204.4	14.7	5.0	3.5	+++
	11.16	65	205.0	14.6	5.0	3.1	+++
	11.30	79	195.3	14.3	5.1	3.0	++
	12.22	101	191.2	13.8	5.5	2.6	+
	12.28	109	188.6	14.0	5.4	2.1	-

Note: * Synthetic impressions of sarcocarp quality and taste.
These were classified as follows.
++++; Excellent in both the sarcocarp quality and taste.
+++ ; Lightly down of sarcocarp quality and taste
++ ; Down of sarcocarp quality and taste
+ ; Severely down of sarcocarp and taste but still be edible
- ; Completely down of quality by inedible level

Among the expected changes due to the storage, decrease of the weight and sugar content were quite little, but decrease ranges of acidity and hardness were rather big. Eating quality might be influenced by the latter ones. As time of storage went on, pH value showing the acidity had become around 5.0, and hardness had become under 3.8 kg, and eating quality was felt to down. Finally, where the acidity had decreased until

pH value showing as 5.4 and the hardness had also decreased up to 2.1 kg, the fruits had become inedible.

On the other hand, the result showed that the harvesting time in the maturity season had influenced to the fruits' qualities. This is to say that the sample harvested in August 23 was no any changes in qualities during 64 days after the starting of storage, but the other sample harvest in September 12 was kept their shapes during only 30 days after the harvesting. It means that the early harvesting fruits could be stored during about 2 months without any changes their qualities, but the fruits harvested in normal harvesting time could be stored during only 1 month. Actually, the former ones could keep their qualities until October 26, but the latter ones could keep the qualities until just October 12 on the calendar day.

Unfortunately, a trouble had occurred in the humidifier of the storage chamber, so that the humidity in the storage house had become too high. Water drops were had made on the surfaces of the specimen like making them to dip in the water. If it is not faced to such trouble, the sample might be stored for a long time more.

The storage test for early harvested fruits had planned again in 1995 too. But a trouble had occurred in the storage house in that early harvesting time. So that, it could not be made. Therefore, the storage test was made for normally harvested sample only. The result is shown in Table 2-5-53 together with the variety of Osa Nijisseiki.

Table 2-5-53 Result of storage test of Nijisseiki and Osa Nijisseiki pears (1995)

Variety and Harvest date	Observed date	Duration from storage started days	Weight per fruit g	Sugar content Brix	Acidity pH	Hardness kg	Eating quality *
Nijisseiki							
	9. 8	7	191.4	15.2	4.9	3.5	++++
	9.15	14	204.2	15.1	4.9	3.2	++++
9. 1	9.22	21	196.8	15.8	4.9	3.4	++++
	10. 2	31	225.9	15.2	4.8	2.6	+++
	10. 6	35	199.4	15.3	5.0	2.3	+
	10.13	42	197.2	14.9	5.1	1.8	-
Osa Nijisseiki							
	9.15	11	237.7	14.9	4.8	3.4	++++
	9.22	18	193,5	14.9	4.9	3.0	++++
9. 4	10. 2	28	199.7	14.5	4.9	2.8	+++
	10. 6	32	198.4	14.7	5.0	2.6	++
	11.13	39	185.0	15.6	5.0	2.2	+

Note: * Eating quality was classified as same manner as in Table 2-5-52.

Decreasing of eating qualities of stored fruits had been started to show at the time after 31th day from the starting of storage in the variety of Nijisseiki and 28th day in the variety of Osa Nijisseiki. During the storage period, a trouble had occurred in refrigerator of the storage

chamber, so that there were several days to be unable to keep planned temperature. Therefore, the result might be influenced from this trouble, but both the varieties could keep their qualities during about 1 month.

It is very regrettable that the troubles had occurred in 2 years , and so actual data could not taken from the storage tests. Even though, it had been cleared that the fruits harvested in the normal harvesting time can be stored and kept their qualities during about 1 month, and that harvested in earlier harvesting time of about 20 days than the normal harvesting time can be stored during about 2 months. Where the storage condition is good to keep fruits stable, the fruits may be keep for a long time more.

(5) Storage Test on Fuji Apple

1) Purpose

To make sure the ability of storage in this field in Turkey because that the variety of Fuji is the best variety for storage in Japan.

2) Test Method

The fruits entered into the maturity season were stored in the storage chamber with set temperature of 2℃ to 4℃ immediately after the harvesting. There was no controller for humidity in the storage chamber, but the humidity was about 75% in average during the storage period. The fruits had been weighed one by one before entering them into the storage chamber so that it can be weighed again when the time of picking them out from the storage chamber. The bearing volume was not so much to be harvested at that time, so number of sample for the test was 12 fruits only. Therefore, it was planned that number of sample picked up from the storage chamber for observation was 2 fruits per time, observations were made every other week.

3) Test Result

The observations were made 6 times during 12 weeks. The result is shown in Table 2-5-54.

The weight per fruit had been decreased at 1% during 1 week storage and 4.3% during the period of 12 weeks of storage. The sugar content had been decreased by 1° during 12 weeks, and acidity had been decreased by 0.5 of pH value during the same period. During the period from starting the storage to 6th week after starting the storage, the color of fruits' surface was still nearly green classified as Class 4, but from 8th week and thereafter, their color had been changed to yellowish color classified as Class 6. The eating quality as an important factor among the total qualities had been tone down from 10th week after starting the storage.