

Title: Project 77-A4 - Navel Orangeworm Research
Part I - Orchard Management
Part II - Ballico/Famoso Project

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Part I - Orchard Management

- I. Objectives: (1) To determine any benefit from orchard sanitation (removal of mummy nuts from trees) when practiced in a small area surrounded by non-cleaned orchards. (2) To determine artificial methods of wetting trees and any procedures that will maximize removal of mummys when foggy or rainy weather are not available.

II. Interpretive Summary

The effectiveness of orchard cleanup applied to small acreages susceptible to fly-in of navel orangeworm moths from adjacent uncleaned orchards has been a concern. However, tests on small acreages adjacent to uncleaned orchards indicate that cleanup is effective. The Chico orchard consists of four 20 acre blocks surrounded on three sides by uncleaned almonds (Fig. 1). In addition to the orchard cleanup the Chico grower has experimented with Sevin[®] applications after hull crack in 1976 and 1977. He also has his own huller and drier. The drier which was installed in 1974, enables him to harvest his nuts before they are completely dry. This, of course, saves him the NOW damage that would have occurred had it been necessary to wait until the hulls had dried naturally. In 1977 all of his crop was passed through the drier prior to hulling.

It would appear that the application of Sevin[®] twice during hull split, at 5% and 25% split is effective in reducing NOW damage.

The artificial wetting of trees does not appear to be effective in increasing mummy nut removal during periods of dry weather.

III. Experimental Procedure:

The grower had planned to clean each of his orchards. However, the drought conditions of the 1976-77 winter resulted in little fog or rainy weather. There were enough foggy days to allow him to clean his Drake trees in Block - 1 (fig. 1). He reports that he had attempted Nonpareil cleanup but that it was "too slow and too dry." Only block #1 had been sprayed with a pesticide in the winter, Diazinon[®] plus oil. All blocks were treated with Sevin[®] twice before harvest. The first spray was applied on August 1 by helicopter at approx. 5% hull split and the second was applied at about 25% hull split. Harvest operations began September 14. The entire crop was machine dried prior to hulling. Light traps were placed in the orchards as a means of monitoring population fluctuations and providing data for comparison with previous years.

A Fresno area grower cooperated with us in a dormant tree shaking experiment set up to determine whether or not the addition of water by means of a dilute sprayer could replace foggy, damp conditions in facilitating mummy nut removal. The test was set up as follows: Eight rows of trees were used, four Nonpareil and four Merced. Two rows (1 Nonpareil and 1 Merced) were sprayed with water alone, two with water and an oil (0.5 gallons/100 Maximul[®]) and two with water and a surfactant (1.5 pt/100 Nofoam B[®]). Two rows not sprayed were used as controls. The rate of spray application was 700 gallons/acre. Nut counts were made for all trees prior to shaking. The spraying was done from 1500-1645 on January 17, 1977. Shaking was done the following day at two different periods, in the morning from 0715 to 0815 (every other tree) and in the afternoon from 1330 to 1430 (all remaining trees). Nut counts were made right after shaking. Follow-up nut counts were made June 2, 1977.

IV. Results:

As there was no untreated orchard for the Chico test the only comparisons that can be made are with neighboring orchards and the past history of the orchard. As of the preparation date of this report, the grower relates that his neighbors are suffering the highest rejects in their histories (an average of 15%). We are unable to confirm this at this time. However, reference to table 1 shows that this grower has succeeded in reducing his rejects substantially from the high rejects he suffered in 1972. It should also be noted that 1975-1977 represent years in which he had applied some form of NOW control.

The light trap catches are shown graphically in figs. 3-5 and discussed in more detail in the discussion section of this report.

The dormant tree shaking experiment resulted in no significant differences in mummy removal (table 2).

V. Discussion:

The data from this year's work in Chico and other data from individual 20 or 40-acre orchards continue to indicate that orchard sanitation is a profitable method of control for NOW. Having wet weather, either drizzle or wet fog during December and January, has proved to be the biggest problem in getting a thorough cleanup of mummy nuts and in getting over grower's entire acreage.

It would appear that the application of Sevin[®] at hull split is effective at reducing NOW damage. However, one must consider the fact that the grower harvested some of his crop at an earlier state of maturation than did his neighbors and this could have contributed considerably to the reduction of NOW damage. It is interesting to note that the grower plans to clean only the Drake variety in spite of the fact that in 1975 (Table 1),

his percent reject figures for Nonpareil in blocks 1 & 3 (both of which were cleaned) were all time lows for him. We feel that although Sevin[®] application at hull split may reduce NOW infestation it should be used in conjunction with mummy nut removal.

Fig. 3 shows the growers success in reducing NOW damage by orchard clean-up in 1975. Comparison of figs. 4 and 5 illustrates the effectiveness of the two Sevin[®] application in reducing the NOW population. Note the unusually low peak in moth catches in September, 1977. Figure 2 illustrates the growers success in reducing NOW damage in the Nonpareil variety by various combinations of orchard cleanup and Sevin[®] sprays during the years 1975-1977.

With regard to the dormant tree shaking test in Fresno, we were disappointed with the results although not surprised by them. Table 2 shows that nut removal was between 89 and 97% regardless of treatment. The shaking was done under fairly moist conditions, so the test really needs to be repeated for a variety of conditions. Although the wetting of the nuts appeared to be quite thorough, apparently it requires continuous moisture over a period of hours in order to enhance mummy nut removal. We have observed past situations where foggy, damp conditions resulting in easy mummy removal have been followed by a drier, overcast day yielding poor mummy nut removal.

Part II - Ballico/Famoso Project

I. Objectives: To investigate the effectiveness and practicability of an integrated pest management program for suppressing navel orangeworm populations in almond orchards by means of orchard sanitation, early and rapid harvest, and insecticidal control of the peach twig borer.

II. Interpretive Summary:

The Ballico/Famoso Project involves a 12-mi² test area with 60 growers and 2600 acres of almonds plus a 9-mi² check area with 63 growers and 2200 acres of almonds in Merced County and a 380-acre test area plus a 440-acre check area, all one solid block of almonds owned by one grower, in Kern County. Residual fruits on hosts such as almonds, walnuts, peaches and various yard plants are removed from trees during December and January by mechanical and hand labor operations. Peach twig borer sprays are applied by most growers during the dormant season. Early and rapid harvest are encouraged where possible.

Mummy almonds and walnuts can be removed effectively and economically by trunk shaking trees over 20 feet tall and by hand poling trees less than 20 feet tall during foggy or rainy weather when trees are thoroughly wet. The moisture soaks into gums making them gelatinous and adds weight to the almonds making them come off the trees much more easily than is the case during dry weather. NOW populations have been suppressed enough by these operations to give 50-60% control in comparison to a check.

A dormant spray controlling peach twig borer has an important bearing on NOW control programs and is an essential part of good orchard management. Hull or nut meats damaged by peach twig borer or oriental fruit moth are preferred by NOW for egg laying, and the damage increases survival of the small orangeworms, helping NOW population build-up. Peach twig borer when uncontrolled can infest up to 40% of the Nonpareil meats in an orchard.

Rapid harvest practice, getting almonds off trees and into the huller as early and quickly as possible, also is essential to NOW control. ARS studies in 1973 have shown instances where orangeworm damage doubled in Nonpareils and quadrupled in Merceds in the harvest period. In 1977, weather conditions extended almond harvests and produced good illustrations of the orangeworm's ability to increase reject percentages in both cleaned and sprayed orchards.

Growers can expect to pay \$15-30 per acre for orchard cleanup. Trunk shaking costs \$7-25 per acre with an average of \$21 per acre. Hand poling trees less than 12 feet tall averages \$10 per acre (range \$3-14), and hand poling trees over 12 feet tall averages \$20 per acre (range \$15-30). When closed-shell, thin-hull Mission are present in plantings, costs are in the low part of the ranges as this type of Mission does not harbor enough NOW to warrant cleaning. When trees are dry or have large numbers of nuts for hand poling or require scaffolding by trunk shakers, costs are in the upper part of the ranges.

Trunk shaking is recommended for most trees over five or six years old, as it is cheaper and the shaker damages trees less than does hand poling. Some fruit buds are removed by shaking, but there is no reduction in subsequent crop size. In contrast, hand poling can remove buds in an indiscriminate manner, slightly reducing the crop potential -- especially on Merced and Thompson varieties where many of the mummy fruits and buds are located along main limbs. Of course, hand poling may be appropriate along with pruning trees less than 20 feet tall and when these trees have less than 50 mummies per tree.

Adequate removal of mummy nuts or "how clean is clean," has not been pinpointed. Under suitable conditions for orchard cleanup, no more than 5-10 mummies per tree should be left on Nonpareil, Neplus, Merced and Thompson trees, and

no more than 20-30 mummies per tree should be left on Daveys and Drakes. Bird activity will remove remaining nuts in many areas of the State. This is particularly true in orchards near river bottoms, in flyways, or adjacent to other crops which support noticeable bird activity. Many of the most severe orangeworm problems are in areas of large, solid blocks of almond plantings. Here the bird activity may be inadequate relative to the number of mummies present.

Once the nuts are on the ground, it is important that they are destroyed before March 1 when moth emergence usually begins. ARS tests have established that normal operations, discing or flailing, combined with orchard floor management and environmental factors conducive to rotting, will destroy the nuts and navel orangeworms present. However, nuts on herbicide treated ground, especially those on berms or permanent irrigation checks should be blown or swept to the middle to be disced or flailed and exposed to rotting moisture.

Since fog and moisture during the winter months can be limited, making cleanup hard to complete, the following suggestions are offered:

Follow a cleanup priority so that the most susceptible and difficult varieties are knocked during optimum conditions. Here is such a priority listing:

Merced, Thompson and Drake generally have many mummy fruits and need to be cleaned under the wettest possible conditions, preferably after one or two days of wet fog or drizzle. These three varieties are considered to be prime overwintering sites for NOW.

Carmel and Price, for which the ARS has no experience, should be cleaned on very wet days until experience dictates differently.

Nonpareil generally do not need to be as wet as most of the other varieties to obtain adequate cleaning. Some may be cleaned in the afternoon following a foggy night, or under other conditions when the trees are moist rather than

dripping wet with water. However, Nonpareil trees in Kern County tend to have more mummies than any other variety. Generally, very wet conditions are required to get adequate cleaning of Nonpareil trees having many mummies.

Davey should be cleaned under very wet conditions, but this variety is one of the least important as a source of NOW. The hulls generally come off leaving only the meat and shell on the tree and this makes it difficult for NOW survival.

Neplus and Peerless can be cleaned under moist conditions similar to those required for Nonpareil. These varieties may harbor many NOW. However, in most orchards the mummies fall off the trees of these varieties; it may be more economical to hand pole the few remaining nuts either along with pruning, or in January after many of the nuts have already fallen.

Mission with a closed shell and thin hull are of minor importance for overwintering NOW. This type of Mission does not need to be cleaned. However, a grower may want to consider cleaning Missions to further concentrate any bird activity on the few remaining mummies in the orchard.

Mission that have thick hulls and open suture in the shell are good overwintering sites for NOW. These should be removed under very wet conditions as for Merced.

Some growers conducting winter cleanup have "maximized" the number of hours of fog or heavy dew by shaking trees at night.

III. Experimental Procedure:

All of the almonds on 820 acres of the Famoso grower were shook during the winter and sprayed with insecticide in 1977, and a 127-acre-block was left uncleaned but did receive the same insecticide treatments as the cleaned acreage. All of the acreage received a dormant spray for peach twig borer, a Guthion[®] spray on May 13 and a Sevin[®] spray by helicopter on July 20. Moth

populations were monitored from early March to October with blacklight traps for NOW and pheromone traps for PTB. A series of nut samples was taken prior to and at harvest to trace the rate of increase in infestation of Nonpareil and Merced meats and hulls. Forty sample sites were selected in the test area from which 100 Nonpareil nuts per site were taken on each of 4 dates (July 26, August 9, August 23, September 6). Thirty sample sites each were selected in the test from which 100 Merced nuts per site were taken on each of 4 dates (Aug. 23, Sept. 6, Sept. 20, Oct. 4). Five sample sites each of Nonpareil and Merced were used in the check block. The sampling dates were the same as those for the test area. The samples from Aug. 23 for Nonpareil and from Oct. 4 for Merced are used in this report to represent differences between test and check areas, as sample analyses of the more complete sampling of the areas have not yet been made.

The 2600 acres of almonds in the Ballico test were cleaned prior to the 1977-crop either by use of 14 trunk shakers or by a 25-man handcrew. Most growers (ca. 80%) put on a dormant spray for PTB control at their own expense.

Four orchards in the test and three orchards in the check having a history of high rejects were selected as trap sites for monitoring NOW and PTB populations. A series of nut samples was taken to chart the rate of increase of insect damage in hulls and meats up to harvest. Eighteen test area orchards with 5 sample sites in each one and 3 check area orchards with 5 sample sites in each one were selected from which 100 Nonpareil nuts per site were taken on each of 4 dates (Aug. 2, Aug. 16, Aug. 30 and Sept. 13). Some samples were taken from test area growers that had not harvested on Sept. 27. Neplus, Merced and Thompson varieties were also sampled from a few orchards on 5 dates (Aug. 16, Aug. 30, Sept. 13, Sept. 27 and Oct. 10). The final evaluation of the effectiveness of the Ballico Project will be made

on the CAGE retest of duplicate nut samples obtained from handlers to represent all growers in the test and check areas. Navel orangeworm and all other types of defects will be separated in these retests.

IV. Results:

Comparisons of 1975, 1976 and 1977 mummy nut counts for the Ballico and Famoso areas are shown in Table 3. In 1977, the percent reduction in mummy nut counts for Nonpareil, Merced and Mission at Famoso was 91, 92 and 81%, respectively. Grower costs at Famoso were \$7/acre for winter shaking plus \$2/acre for blowing nuts off of herbicide treated berms.

Mummy nut counts for the Ballico test and check areas were somewhat lower for most varieties in 1977 than in 1976 due to slightly improved conditions during the 1977-cleanup period. Considering all varieties, there were about 80% fewer mummies in 1976 and about 90% fewer mummies in 1977 in the test compared to the check.

Blacklight trap catches for entire years (Table 3) showed considerable reduction in numbers for 1977 as compared to previous years in Famoso. Comparable data for Ballico shows a slight reduction in numbers in the test area for 1977 over the previous year.

Blacklight trap catches (Fig. 6) for Famoso show the difference between the cleaned area and that which was treated with insecticides alone. NOW reject percentages for Nonpareils were 7.5% in the test and 16.5% in the check at harvest. They were 3.2% and 6.6% just 2 weeks prior to harvest at which time the nuts could have been harvested. There was no PTB damage to almond meats in this orchard.

Blacklight trap catches show NOW populations were suppressed by orchard cleanup in the Ballico area (Fig. 7) throughout the season. Trap catches were somewhat lower in 1977 than in 1976 for both the test and check areas

(Table 3), but still considerably higher than 1975 trap catches.

Preliminary data show NOW damage to Nonpareils to be 4.6% in the test and 6.0% in the check. Six of the 18 test area growers had 4% meat damage due to PTB and one grower had 9% PTB damage because of lack of or poor application of dormant sprays with a phosphate insecticide. This undoubtedly caused much of the NOW damage in these orchards.

V. Discussion:

Previous observations showing that mummy almonds come off the trees much more easily in foggy or rainy weather in both hand and mechanical cleaning were confirmed again during this year's work. The trees must be thoroughly wet for adequate removal of mummies from most varieties and for economical operation of a hand cleaning operation. Nonpareil trees may be cleaned in less than ideal weather. Trees with few mummies and no more than 20 feet tall may be cleaned by hand in dry weather, perhaps in combination with pruning operations.

The year 1977 was the third and final year of the Ballico/Famoso project. The results of the first year of orchard cleanup (1975-crop) looked very good for most growers in the test area. Some growers with a history of rejects below the 4% level will find it uneconomical to try to control NOW unless they have very high almond production. With the dry winter and poor cleanup prior to the 1977-crop, we did not expect a very favorable comparison between the Ballico test and check areas for the 1977-crop. However, it now appears that most test area growers that had their PTB under control will have much lower rejects than check area growers and other Merced County growers that did nothing for NOW control.

Personal visits and questionnaires will be used this spring to determine the operations of check area growers during the 1975, 1976, and 1977-crop

production years. Some growers are known to have cleaned their orchards or altered their operations in other ways to reduce NOW damage.

Also growers in Merced County outside the test and primary check area for which we have complete records (1971-1977) will be used as a second check area. This should provide a better picture of our progress in the Ballico Project.

Table 4 shows what at least one grower has done in Merced County as a result of the Ballico Project. In 1977, he applied a dormant spray for PTB, winter cleaned his orchard, applied one Sevin[®] spray after hullsplit and fumigated in hull all varieties. He had the lowest rejects in Nonpareil and Neplus that he has had for the past 7 years and fairly low rejects in the Merced variety (much was probably gummy). The 1977 Nonpareil and Neplus rejects are 75% lower than the 1976 rejects even though most Merced County growers had record high rejects in 1977.

Results in Famoso bear out our contention that orchard cleanup should be considered a cornerstone of NOW control. Additional measures aimed at controlling PTB and OFM serve to prevent rapid spreading of the NOW after hull split. Indeed, much of the benefit derived from Sevin[®] and Guthion[®] applications may accrue from effects upon these two pests. Famoso personnel report that reject percentages for Nonpareil were so low on some of their ranches that they had received premium payments for the first time in 1977. The particular ranch on which we conducted our experiments has always had higher rejects because it is the last one to be harvested each year.

VI. Publications:

Same as for 1976 Annual Report.

Orchard Management for Navel Orangeworm Control

by Charles E. Curtis
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A grower should first determine whether or not he has a problem that warrants spending money on navel orangeworm control. He should look at his grade sheets for the last 3-5 years. For each year, he should add up the reject pounds for all varieties and multiply by an appropriate value per pound, add to this 20% of the value of the rejects to give an idea of what was removed at the huller and never showed up on the grade sheets, and add to these figures the values for the handler's service charges for excess rejects. The total for all of these values should then be divided by the total number of acres to find out what the grower has to work with.

One of the main things for a grower to remember is that no one thing is likely to control navel orangeworm. A grower must have a clean orchard and adequate peach twig borer control and a timely harvest. If a grower has had a real problem with navel orangeworm and his individual economic situation warrants it, he may want to consider a Guthion[®] spray or Sevin[®] sprays. However, a dirty orchard may cancel much of the potential benefit from sprays. Also, a late harvest may cancel much of the potential benefit from sprays or orchard cleanup.

Orchard sanitation means removal of mummy nuts from the almond trees during foggy weather or misting rain in November, December and January by hand poling or mechanical trunk shakers. This will cost between \$10-30 per acre depending on whether or not a grower is doing his own work and also on the size of the trees. When foggy and damp conditions are limited in your area or in a given year, night shaking may prove useful for maximizing the number of hours of damp conditions. The removal of mummy nuts will concentrate bird activity on the few remaining nuts resulting in a thorough cleanup job.

A dormant spray for peach twig borer is essential to good orchard management. These insects can cause much direct damage to nuts as well as increase the possibilities for navel orangeworm damage to almonds. A grower should treat all of his acreage every year with a phosphate insecticide in his dormant spray. A dormant spray is the least disruptive of any of the possible sprays as far as destroying beneficial insects.

Early and rapid harvest - getting almonds off the trees and into the huller as early and as quickly as possible - is extremely important. One does not want to damage his trees by shaking them too soon after an irrigation, and one does not want to knock so early that he leaves excessive numbers of nuts on the trees losing crop value and leaving overwintering sites for the navel orangeworm. However, a grower does not need to wait until every nut on the tree is thoroughly dry. Many nuts within the tree canopy may still have green-open hulls but may come off the tree quite easily. A grower should check his trees in various blocks in his orchards daily to determine when to start knocking. The almonds should be picked up and hulled as soon as possible to prevent further damage to the almonds and to prevent navel orangeworm moths from emerging from the knocked nuts to reinfest other varieties still on the trees. Use of a dryer can cut damage by speeding up the harvest. If the nuts are to be held a few days before hulling, in-hull fumigation should be used to stop insect damage.

More complete information on the economics and mechanics of these operations may be found in the following publications: 1) Almond Facts 41(6):4-8 (November/December 1976), "Economics of NOW Control and Implementing Orchard Cleanup," 2) "Better Almond Production" (Green cover) published by the Almond Board of CA, June 1977, 3) Almond Facts 42(1):5-11 (January/February 1977), "Drying Can Make the Difference."

Table 1.-- % Total Rejects and NOW Rejects (in parentheses) for Chico

Block No.	Variety	1972	1973	1974	1975	1976	1977 ^a
1	Np	19.04 (17.37)	5.57 (4.05)	7.29 (6.85)	3.38 (3.08) ^b	6.13 (5.98) ^d	4.50 ^d
	Ne	9.85 (9.37)	6.03 (5.02)	7.92 (6.51)	2.92 (1.95) ^b	3.94 (3.29) ^d	2.12 ^d
	Dr	18.74 (18.27)	14.65 (13.47)	16.34 (15.91)	21.51 (21.51) ^b	12.18 (12.18) ^d	2.15 ^f
4	Np	20.52 (19.37)	6.77 (5.24)	9.99 (9.39)	3.31 (2.94) ^b	4.76 (4.51) ^e	4.80 ^d
	Ne	7.06 (5.56)	5.60 (4.12)	7.60 (6.06)	3.54 (2.95) ^b	3.94 (3.29) ^e	1.59 ^d
	Mi	1.31 (0.66)	0.11 (0.06)	1.31 (0.66)	0.41 (0.20) ^b	0.60 (0.30) ^e	—
3	Np	16.22 (14.36)	5.91 (3.90)	11.30 (10.77)	6.67 (5.98) ^c	7.06 (7.04) ^d	6.10 ^d
	Ne	7.18 (6.67)	3.67 (2.69)	7.92 (6.46)	3.82 (2.91) ^b	3.93 (3.29) ^d	1.59 ^d
	Mi	1.87 (0.93)	0.39 (0.20)	2.18 (1.09)	0.84 (0.42)	0.59 (0.30) ^d	—
5	Np	18.07 (16.93)	4.89 (3.72)	13.84 (13.35)	8.27 (7.86) ^c	7.19 (6.77) ^d	5.80 ^d
	Ne	7.09 (5.72)	2.94 (1.71)	7.92 (5.90)	3.86 (2.94) ^b	3.97 (3.29) ^d	1.59 ^d
	Mi	0.41 (0.20)	0.28 (0.14)	2.16 (1.08)	0.83 (0.41)	0.59 (0.30) ^d	—

^a NOW reject data not yet available, total reject data is grower's own data transmitted by letter.

^b Cleaned by grower with his own trunk shaker

^c Partially cleaned

^d Two Sevin sprays, 7/24 & 8/4 in 1976, 8/1 & 8/11 in 1977

^e Cleaned plus one Sevin[®] spray on 7/29

^f Cleaned plus two Sevin[®] sprays on 8/1 & 8/11

Table 2.-- Removal of mummy almonds by dormant tree shaking of trees artificially wet with water.

	Merced Variety					
	Morning Shaking			Afternoon Shaking		
	No. of Nuts		%	No. of Nuts		%
	Before	After	Removal	Before	After	Removal
Water	349	11	97	242	11	95
Water + oil	527	29	94	704	79	89
Water + surfactant	395	22	94	467	30	94
No spray (check)	193	14	93	232	32	86
	Nonpareil Variety					
Water	337	32	91	252	9	96
Water + Oil	418	6	99	359	13	96
Water + surfactant	323	14	96	158	4	97
No spray (check)	126	4	97	122	4	97

Orchard Sanitation

TABLE 3

Comparisons of 1975-1976-1977-crop data for cleaned and noncleaned orchards in Famoso (corporation orchard) and Ballico (61 growers in a 12-square mile area).

	BALLICO						FAMOSO					
	Test**			Check*			Test			Check*		
	1975	1976	1977	1975	1976	1977	1975	1976	1977	1975	1976	1977
	<u>Mummy Nuts Per Tree</u>											
Neplus	< 1	4	2	16	21	22	—	—	—	—	—	—
Jordanolo	2	4	3	13	18	17	—	—	—	—	—	—
Nonpareil	2	8	4	22	25	33	30**	74*	20**	268	317	219
Merced	3	13	9	34	48	50	11**	32*	19**	116	74	225
Thompson	3	9	17	21	65	34	—	—	—	—	—	—
Drake	18	20	5	275	332	178	—	—	—	—	—	—
Davey	17	88	44	---	302	412	163**	643*	315**	723	993	---
Mission	33*	27	11	49	79	81	248*	227*	63**	245	291	340
* Not cleaned.												
**Cleaned												
	<u>Blacklight Trap Catches</u>											
Cumulative:												
Average	295	1280	927	1750	2525	2301	3060	4240	1989	6030	6030	3508
Peak Week	80	295	276	450	630	825	800	1190	392	1100	1550	746
	<u>Total Rejects (% of Meat Weight)</u>											
Nonpareil	2.2	3.6	4.6	3.2	4.2	6.0	4.4	5.4	7.5	7.1	20.7	16.5
Neplus	2.0	2.8	---	2.3	3.4	---	---	---	---	---	---	---
Merced	3.8	5.1	---	5.5	6.6	---	2.5	15.3	---	12.6	17.5	---
Davey	1.6	1.6	---	1.6	2.4	---	2.6	11.0	---	5.0	17.9	---

Table 4.-- Merced County - grower example showing results of dormant spray for PTB plus winter cleanup plus one Sevin[®] spray after hull-split plus inhull fumigation of all varieties.

<u>Crop Year</u>	<u>% Total rejects by almond variety</u>		
	<u>Nonpareil</u>	<u>Neplus</u>	<u>Merced</u>
1977	2.5	2.2	8.4
1976	9.9	9.5	15.9
1975	7.0	4.3	12.1
1974	3.6	6.1	10.2
1973	2.5	4.8	5.5
1972	5.8	3.3	4.2
1971	4.2	-	11.0

Figure 1

CHICO

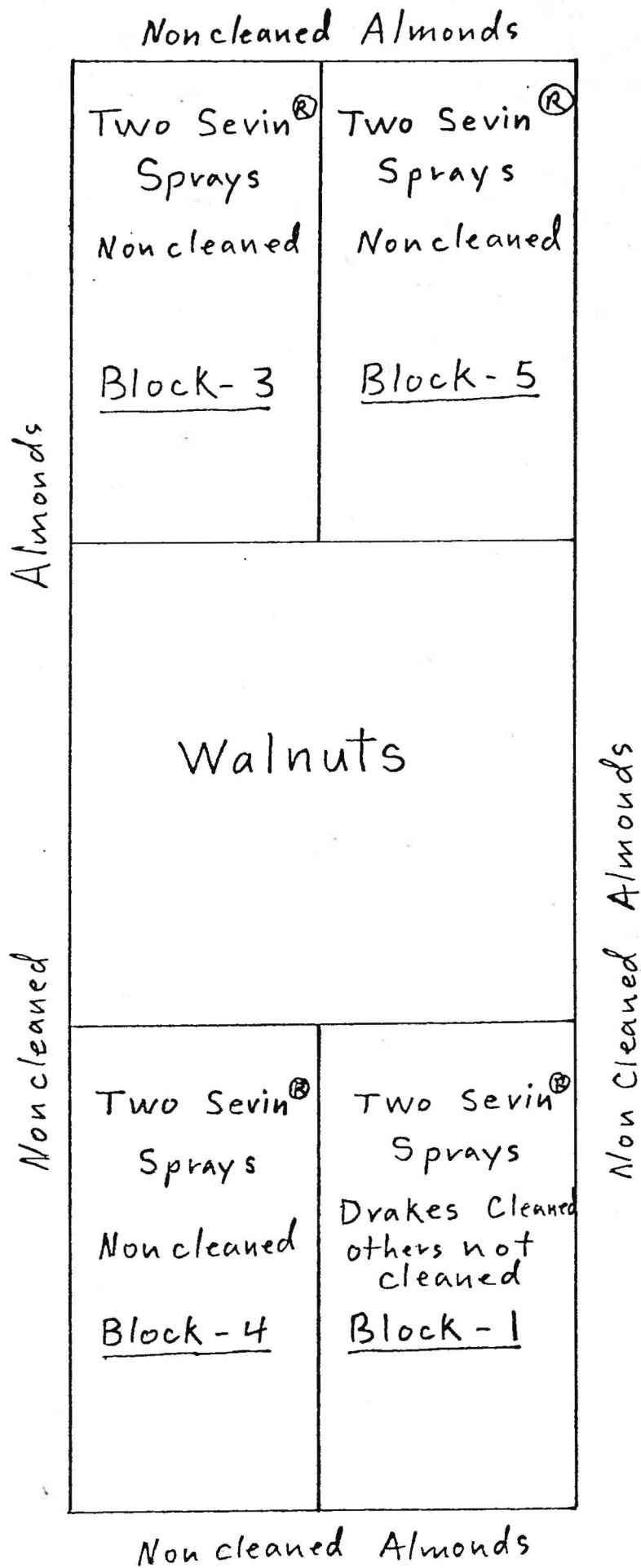
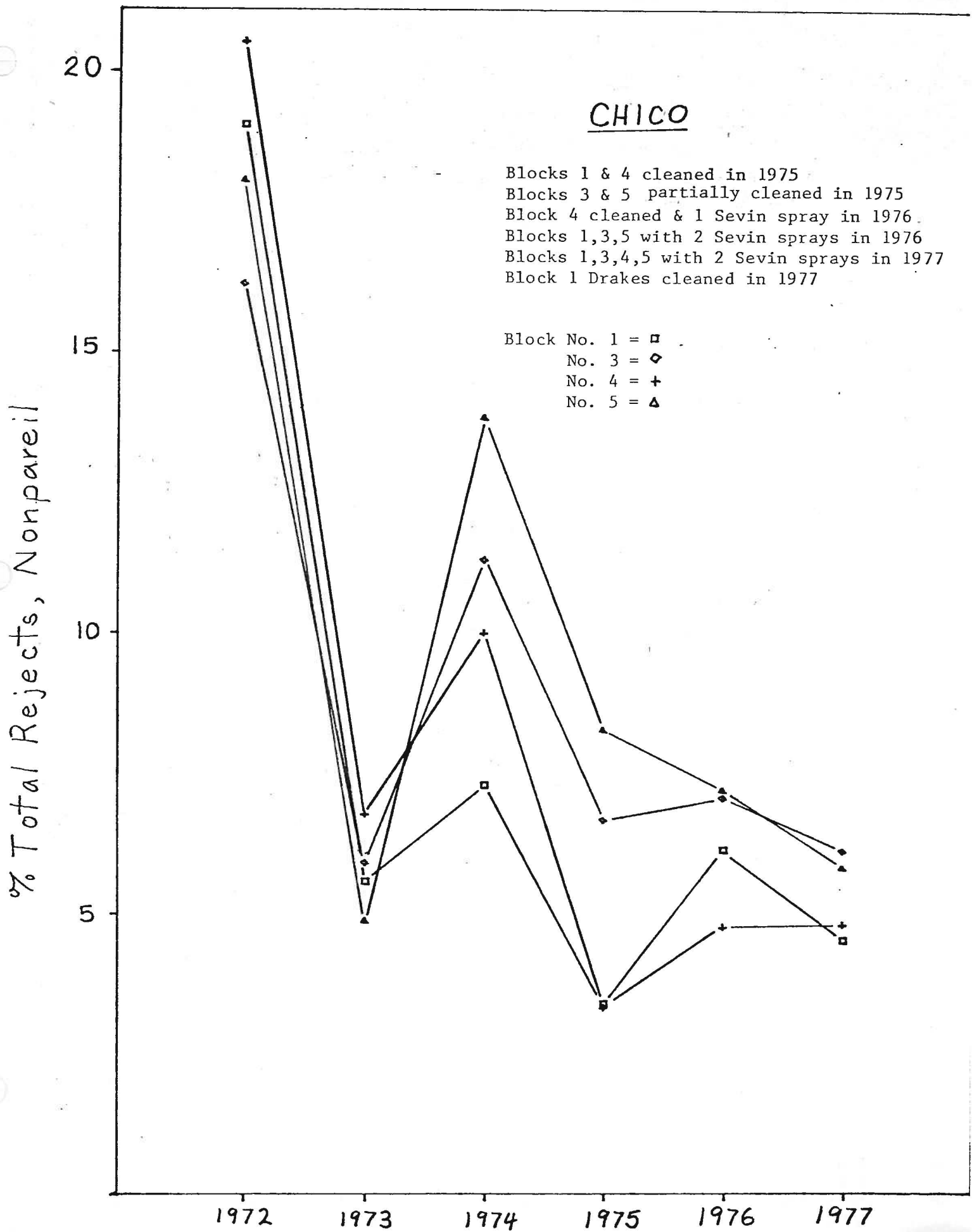


Figure 2



Nonpareil Rejects

Check = 7.5%

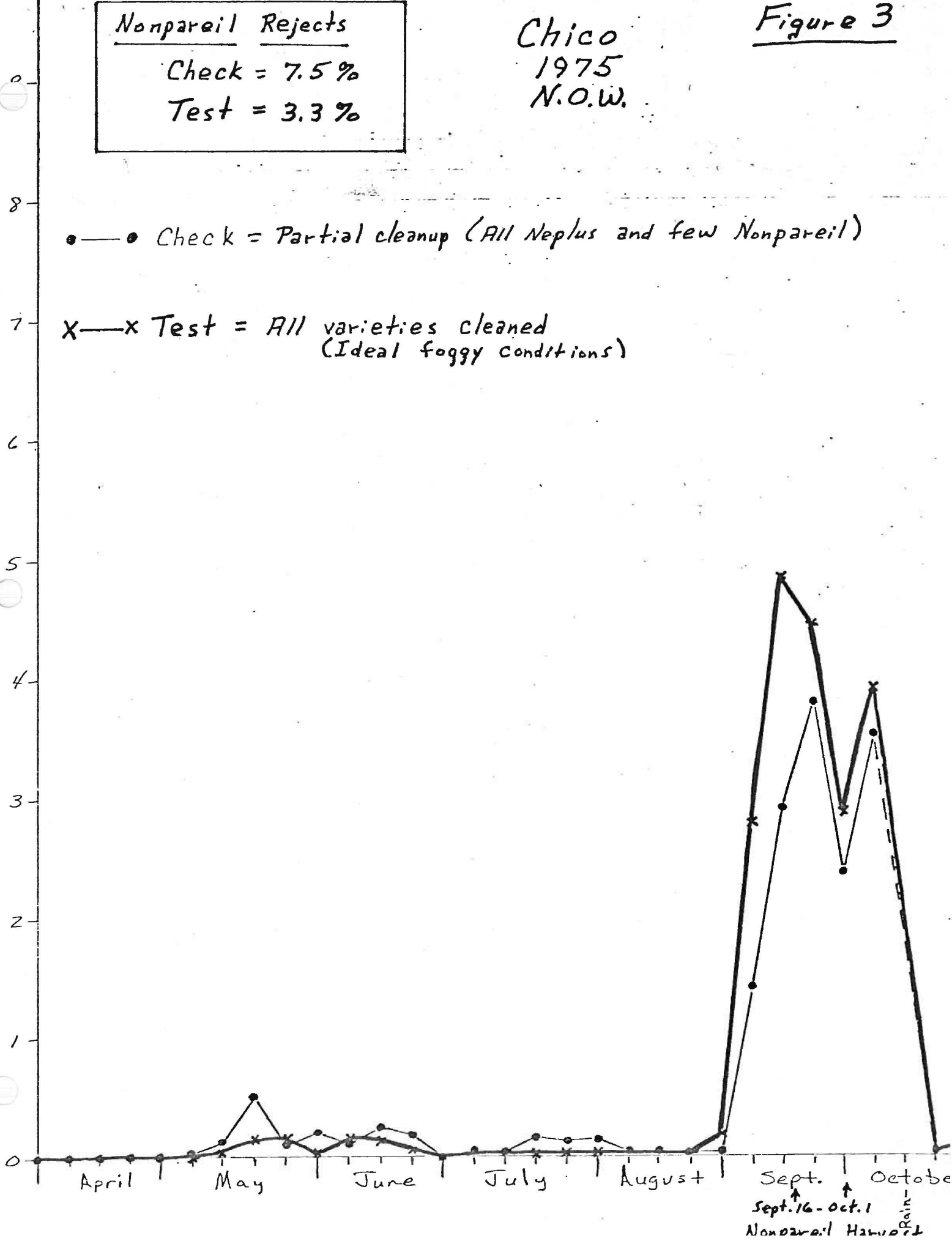
Test = 3.3%

Chico
1975
N.O.W.

Figure 3

●—● Check = Partial cleanup (All Neplus and few Nonpareil)

x—x Test = All varieties cleaned
(Ideal foggy conditions)

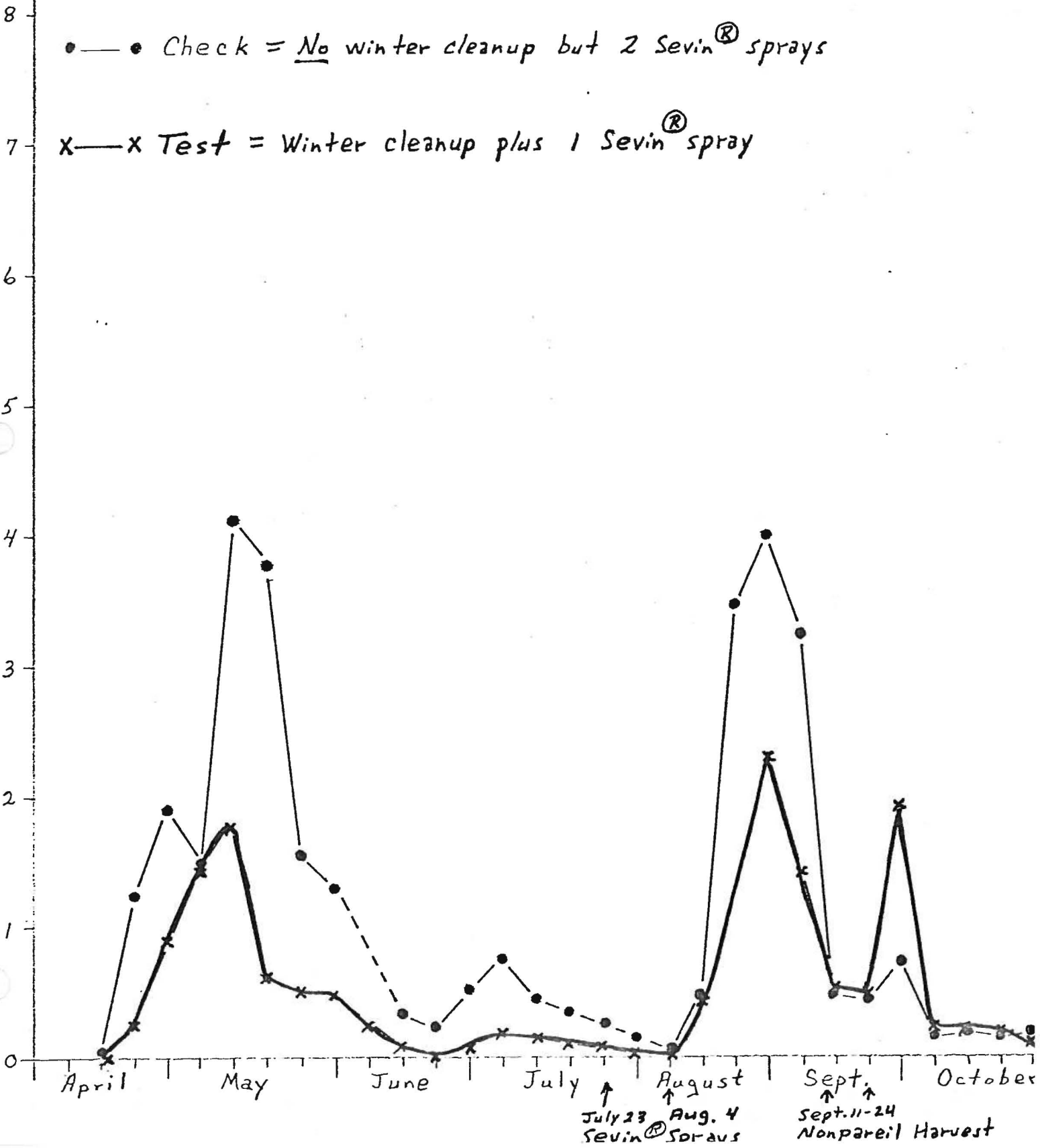


Nonpareil Rejects
 Check = 6.8%
 Test = 4.7%
 Neighbors = about 14%

Chico
 1976
 N.O.W.

Figure 4

average weekly N.O.W. catches in black light traps (x100)



Chico
1977
N.O.W.

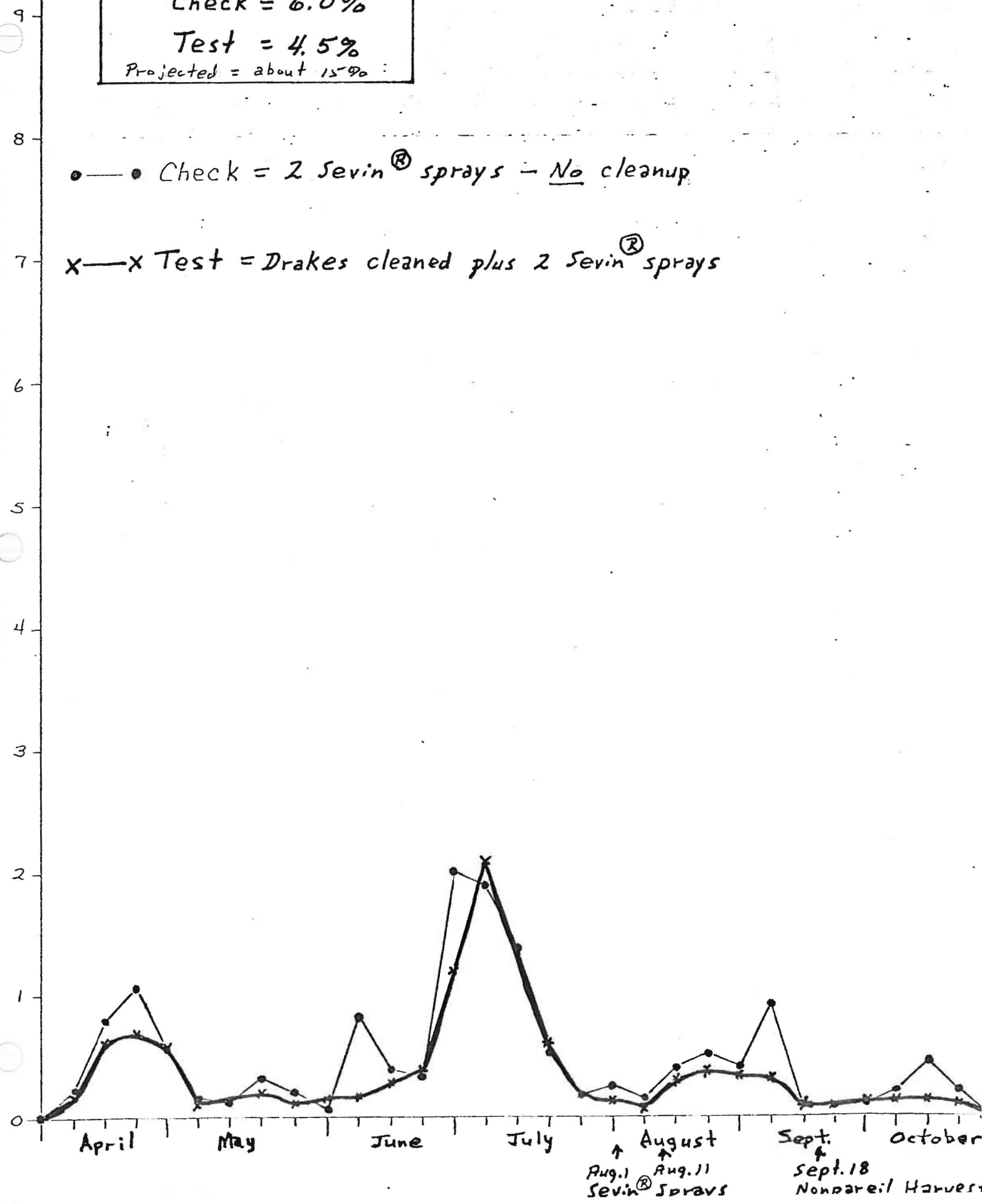
Figure 5

Nonpareil Rejects
Check = 6.0%
Test = 4.5%
Projected = about 15%

NONPAREIL REJECTS (X 100)

●—● Check = 2 Sevin® sprays - No cleanup

x—x Test = Drakes cleaned plus 2 Sevin® sprays



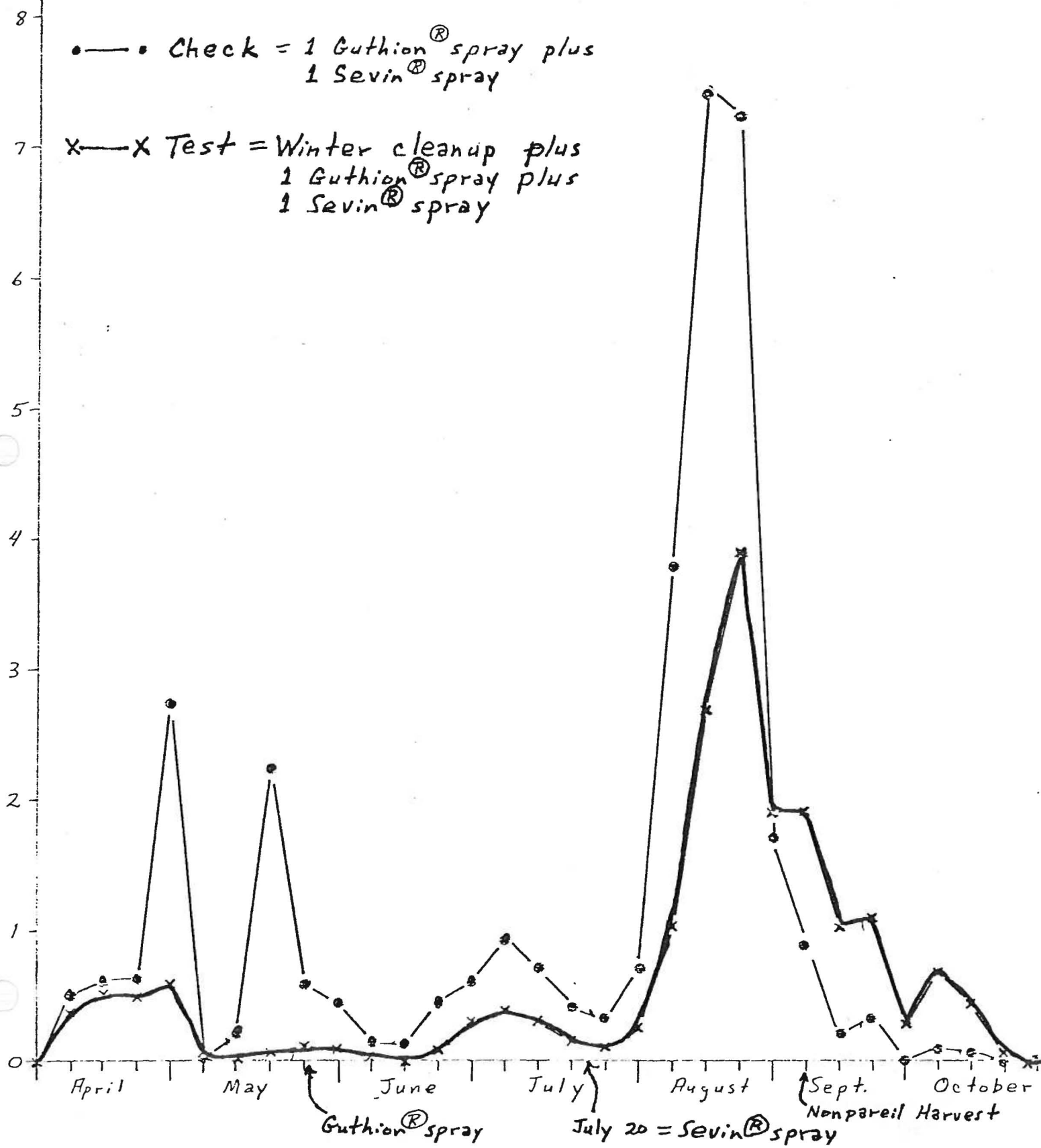
Nonpareil Rejects

Check = 16.5 %
Test = 7.5 %

Famoso
1977
N.O.W.

Figure 6

NUMBER OF NON-PAREIL REJECTS IN BLACK LIGHT TRAPS (X100)



Dallaco
1977
N.O.W.

Figure 7

Nonpareil Rejects
Check = 6.0%
Test = 4.6%

Vertical text on the left margin, possibly a page number or document identifier.

9
8
7
6
5
4
3
2
1
0

●—● Check

x—x Test = 12-square-mile
winter cleanup area
(Less than desirable
fog conditions)

