
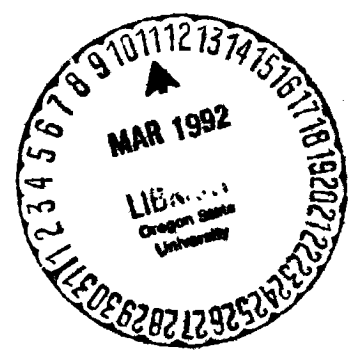


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Labor Demand and Productivity Estimates for the 1990 Caneberry Harvest Work Force



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Caneberry Harvest Work Force**

by

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Demand and Productivity Estimates for the 1990 Caneberry Harvest Work Force

Introduction

Uncertainty over the supply of harvest workers characterizes much of the concern of caneberry growers after the passage of the Immigration Reform and Control Act of 1986 (IRCA). That Act, designed to stabilize and legalize the supply of farm workers in the United States, may have created more doubts than assurances over the supply of workers who typically flock to the state each year to pick fruit. While farm employers worry about an adequate labor supply, little information has been available about the demand for workers or about the ability of different types of workers to pick fruit.

This study provides estimates of the demand for 1990 harvest workers and compares 1990 values with those for the 1988 season. The report covers, for the first time, productivity estimates of the different types of workers employed -- local teenagers, local adults, U. S. migrants and alien migrants -- and describes methods employed to attract and recruit farm workers.

The year 1990 saw the full impact of IRCA on the reporting of farm labor information to the government. This study summarizes the cost of IRCA reporting requirements for the industry.

The caneberry acreage increased slightly in the three

years the surveys cover, from 10,790 acres in 1988 to 10,910 in 1990. The three years also saw a slight decrease in the use of mechanical harvesters -- from 70 percent of the acres harvested in 1988 to 67 percent in 1990. The number of farm workers employed increased slightly between the three years and minor changes were observed in the proportion of types of workers.

Data for the survey were gathered by self-administered questionnaires mailed to a stratified random sample of all known caneberry growers in the state. Growers were asked about the number of 1990 acres in production, total pounds of berries harvested and left unharvested, estimated number of worker-days, the age and type of workers employed, recruitment efforts, I-9 reporting costs and, finally, their major concerns for the 1991 harvest.

Questionnaire items, marginal frequencies and other summary statistics are reported in Appendix A. Completion rates are presented in Appendix B. Methods for estimating the size and productivity of the work force are given in Appendix C.

Results

Estimated size and productivity of the work force.

We estimate that the number of teenagers and migrant workers increased while the number of local adults decreased slightly. A total of 22,792 workers were required to pick

the 1990 caneberry crop. Table 1 shows the frequency breakdown by type of worker for 1988 and 1990.

Table 1. Frequency distribution for types of Oregon caneberry workers, 1988 and 1990

Type of worker	1988	1990
Local workers between 12 and 16 years old	1,709	2,450
Local adults	3,205	3,037
U. S. migrant farm workers	4,700	5,118
Alien farm workers	11,750	12,187
Total	21,364	22,792

Size of the work force increased 7 percent between the two years. The number of local teenagers, U. S. and alien migrants increased while the number of local adults dropped slightly. Table 2 reports the work force proportions and differences for the two years.

Table 2. Proportion of workers who picked the 1988 and 1990 Oregon caneberry crop

Type of worker	1988	1990	Difference
	%	%	%
Local workers between 12 and 16 years old . . .	8	11	3
Local adults	15	13	-2
U. S. migrant farm workers .	22	22	0
Alien farm workers	55	53	-2

Local teenagers were the only type of worker who increased their proportion of the work force between 1988 and 1990. All other groups either lost ground or, as in the case of U. S. migrants, remained unchanged. The percent change in the other three work groups is slight, however. Differences may be due more to an improved method for estimating size of the work force in 1990, compared to 1988, than to a real difference in work force proportions (See Appendix C).

Worker productivity varied as well, but we have data only for the 1990 study. The values are reported in Table 3.

Table 3. Productivity values for types of Oregon caneberry workers, 1990 season

Type of worker	Average number of pounds of caneberries harvested per worker during the 1990 season
Local teenagers	566
Local adults	871
U. S. migrant farm workers ..	1,067
Alien farm workers	1,264

On average, teenage pickers averaged 566 pounds of fruit during the 1990 season, compared to 871 pounds for local adults, 1,067 pounds for U. S. migrants and 1,264 pounds for alien migrants. Although alien migrants made up

53 percent of the work force, they picked nearly 62 percent of the crop in 1990.

The effect of the type of worker on productivity can be evaluated by looking at the ratio of pounds harvested for different pairs of worker types. For instance, if one wishes to find the relative advantage of hiring alien migrants, compared to other types of workers, one would divide the productivity value of each type of worker in Table 3 into the productivity value for alien migrants. The ratios show the relative advantage of alien migrants over other types of workers. If we wanted to compare the advantage of U. S. migrants to other types of workers, we would divide the values for other workers into that for U. S. migrants, and so on. The comparative advantage for each combination of farm workers is shown in Table 4.

Table 4. Productivity ratios (x 100) for types of Oregon caneberry workers, 1990 harvest (read down)

Type of worker hired	Type of worker replaced			
	Local teenagers	Local adults	U.S. migrants	Alien migrants
Local teenagers	100	154	189	223
Local adults	65	100	123	145
U.S. migrants	53	82	100	118
Alien migrants	45	69	84	100

Reading down the right-hand column of the table allows one to estimate the number of workers required to replace alien migrants. For example, 223 teenagers, 145 local adults or 118 U. S. migrants would be required to replace 100 aliens. One could also estimate how many other types of workers are needed to replace 100 teenagers by looking down the first column of figures in Table 4. We estimate that it would take 65 local adults, 53 U. S. migrants or 45 aliens to complete the harvest work of 100 local teenagers. Other comparisons are possible by reading down the appropriate column of the table.

Concerns over the availability of workers.

The availability of farm workers and worries over minimum wage requirements for piece-rate harvest remains uppermost in the minds of growers surveyed. For instance, when asked to list their major concern for the 1991 harvest, 42 percent of sample said worker availability (46 percent cited market price, 25 percent mentioned the effect of the minimum wage law, 15 percent paper work, 14 percent weather and crop pests and 9 percent government regulations.) The new minimum wage law provided an incentive for growers to hire the most proficient workers. Given that alien migrants are the most productive workers, we can expect an even greater demand for aliens in 1991 when the minimum wage rises to \$4.75 an hour, assuming the supply remains plentiful and the acreage of machine-harvest berries does not increase.

Growers estimated that nearly one-fourth of the workers who were paid by piece-rate could not make minimum wage and between 1,188 and 1,594 were laid off for that reason.

Recruitment of workers.

Growers used numerous sources to locate and hire workers. Conventional wisdom suggests that fear of labor shortages, IRCA reporting and enforcement requirements, and new minimum wage levels will lead growers to rely more on labor contractors than on more traditional recruitment methods. The data show that labor contractors do supply large numbers of local workers. About 90 percent said they had used a labor contractor for that purpose. Eighty six percent employed a contractor to supply alien migrants, a slightly lower percentage.

The data also indicate that growers rely on several recruitment methods to locate alien workers. For example, nearly all growers said they had received out-of-state telephone solicitations. Two-thirds had kept in contact with workers who had picked for them previously. (The same percent hired workers who return year after year.) Local newspaper want-ads were employed during the picking season for 98 percent of the sample. The same percent said they sought workers through state employment offices. Employees for 66 percent of the growers recruited workers for their employer. And, 65 percent of the growers said they hired walk-ons. Recruitment methods do not vary much for local workers or U. S. migrants. Nor did any single method

dominated the strategies for locating harvest workers. Rather, many methods were employed and most were used heavily.

However, labor shortages occurred for both picking seasons. An estimated \$121,000 was lost in 1991 because growers could not find enough pickers to harvest all their fruit. Workers either had left to harvest other fields or had shifted to other crops where picking was more favorable to them.

Cost of I-9 verification.

Growers completed an estimated 47,197 I-9 forms for the 1990 season. A total of 43,610 were approved and 3,587 were rejected.

The survey indicates it takes an average of about ten minutes to complete and verify one I-9 form, with a range of 2 to 33 minutes per form. Growers or family members supervised 83 percent of the I-9s, and hired employees were involved in verifying 14 percent of them. The remaining 3 percent were verified by a combination of growers and hired employees. The average wage paid to hired employees who verified I-9s was \$7 per hour. Using the average time of 10 minutes per form and an average value of \$7 per hour, we estimate that verification of I-9 forms cost growers \$1.16 to verify each. We also estimate that growers paid a total of \$54,748 for verification purposes.

Caneberry growers also raise other labor-intensive crops, such as strawberries, blueberries, cucumbers and

hops. We asked growers to provide information about "...this year's pickers" and have no way of separating reporting costs for caneberries from other commodities that may have been included in their response. Nevertheless, the \$1.16 per I-9 cost and the total estimate for caneberry growers, regardless of other crops they may raise, is useful for planning purposes.

Summary

This survey of labor demand and productivity sought to document the farm labor needs of Oregon caneberry growers for 1990 and to compare the differences in demand between 1990 and 1988. Through a mail survey of a stratified sample of growers in the state, questions were asked concerning the number of 1990 acres raised and harvested, number of acres machine and hand harvested, age and type of worker employed, methods for recruiting farm workers, I-9 reporting and verification costs, and the number of workers who could not make minimum wage picking at piece-rate wages.

The results show that the caneberry acreage increased slightly (from 10,790 to 10,910 acres) between the two years. The number of workers increased about 7 percent, from an estimated 21,364 to 22,792. Acres of machine harvested fruit decreased slightly, from 70 percent to 67 percent. Make-up of the work force shifted slightly between 1988 and 1990. The percent of teen-age workers increased from 8 percent to 11 percent. Local adults and alien

migrants decreased 2 percent each. The proportion of U.S. migrant workers remained unchanged.

Greater productivity for alien migrants, compared to other types of workers, also was observed in the 1990 survey. For instance, alien migrants picked twice as much fruit as local teenagers and 45 percent more than local adults. Although alien migrants made up 53 percent of the work force, they picked nearly 62 percent of the hand-harvested crop in 1990. Growers estimated that nearly one-fourth of their workers who were paid by piece-rate could not make minimum wage and between 1,188 and 1,594 were laid off for that reason.

Growers used multiple sources heavily in order to locate and recruit farm labor. No single approach seemed to be favored. Labor contractors were employed, but not to the extent of personal contact with the state employment office or use of newspaper want-ads.

Finally, the year 1990 is the second year that growers were required to complete employment verification I-9 forms for all newly-hired workers. Growers completed an estimated 47,197 forms for the season. A total of 43,610 were approved and 3,587 were rejected. Each I-9 cost an average of \$1.16 to process. Total cost to the growers is estimated at \$54,748.

APPENDIX A: DESCRIPTIVE STATISTICS FOR THE 1990 SURVEY OF CANEBERRY GROWERS

1. How many acres of alternate-year caneberries, and of every-year caneberries did you raise in 1990? (IF YOU DID NOT RAISE CANEBERRIES IN 1990, WRITE "NONE" AND PLEASE SKIP TO QUESTION 21).

MEAN ACRES RAISED

a. Alternate-year berries . . .	49.55
b. Every-year berries	162.18

2. How many man-days do you estimate you used for non-harvest work during each of the following months.

MEAN MAN-DAYS

MEAN MAN-DAYS

a. JAN-FEB. . .	32.44	d. JUL-AUG. .	73.09
b. MAR-APR. . .	57.38	e. SEPT-OCT .	53.63
c. MAY-JUN. . .	37.04	f. NOV-DEC. .	22.77

3. Did you harvest any caneberries in 1990? (Circle one number)

0% NO (SKIP NOW TO QUESTION 21)
 100 YES
 (N = 314)

4. Did you harvest any caneberries by machine in 1990?

52% NO
 48 YES
 (N = 314)

- 4a. How many acres of caneberries did you machine harvest in 1990?

MEAN = 28.97 NUMBER ACRES MACHINE HARVEST
 RANGE = 2 - 379

- 4b. And, how many workers did you hire to machine harvest your 1990 crop?

MEAN = 5.35 NUMBER WORKERS HIRED
 RANGE = 0 - 50

5. How many acres of caneberries, if any, did you harvest by hand labor?

MEAN = 6.64 NUMBER ACRES HAND HARVESTED
 RANGE = 0 - 257

6. What was the average number of pickers in the field per harvest day? Just your best estimate please.

MEAN = 21.4 AVERAGE NUMBER OF PICKERS PER DAY
RANGE = 0 - 500

7. And, how many days, altogether, did it take to harvest your crop?

MEAN = 24.03 TOTAL DAYS REQUIRED TO HARVEST CROP
RANGE = 1 - 90

8. Considering all your pickers, about what percent would you estimate worked for each of the time periods listed below during your harvest season? (If none, please write "0")

	<u>MEAN PERCENT</u>
a. Those who worked three days or less . . .	31.8
b. Those who worked four days to one week. .	19.8
c. Those who worked from one to two weeks. .	17.3
d. Those who worked over two weeks	31.2
TOTAL . .	100.1%

9. Compared to this 1989, would you rate the supply of caneberry pickers as higher, lower, or about the same as that for the 1990 harvest? (Circle one number)

9% HIGHER
32 LOWER
59 ABOUT THE SAME
(N = 156)

10. How would you compare the overall quality of the caneberry pickers you hired this year to those who picked your 1989 crop -- were they more productive, less productive, or about the same? (Circle one number)

6% MORE PRODUCTIVE
28 LESS PRODUCTIVE
65 ABOUT THE SAME
(N = 156)

11. Approximately how many pounds of caneberries did you harvest in 1990?

MEAN = 117,740 POUNDS OF CANEBERRIES HARVESTED
RANGE = 70 - 1,668,260

12. And, how many pounds of caneberries would you estimate were left in the field unharvested?

MEAN = 10,078 NUMBER OF POUNDS LEFT UNHARVESTED
RANGE = 1 - 400,000

13. About what percent of all harvest workers you employed for your caneberry operation were from each of the following groups? (Fill in your best estimate for each category. If "none", please write "0".)

	<u>MEAN PERCENT</u>
a. Local workers between ages 12 to 16.	18.0
b. Local workers over 16 years of age	31.3
c. U.S. migrant farm workers	18.4
d. Alien migrants	32.4
	TOTAL 100.1%

14. Please tell us whether or not you used each of the following methods to hire local workers, to hire U.S. migrants, and to hire alien migrants for your 1990 crop. (Please answer for each method by circling one number under each worker group)

<u>Method</u> (N = 232)	Local Workers		U.S. Migrants		Alien Migrants	
	<u>YES</u>	<u>NO</u>	<u>YES</u>	<u>NO</u>	<u>YES</u>	<u>NO</u>
	%	%	%	%	%	%
a. Walk-on's (no recruitment)	58	42	70	30	65	35
b. Labor contractor	94	6	88	12	86	14
c. Word of mouth by employees	53	47	73	27	66	34
d. State employment office.	94	6	97	3	98	2
e. Workers who return year after year	50	50	74	26	67	33
f. Out-of-state phone solicitations that offer to supply workers	99	1	100	0	100	0
g. Newspaper want-ads	94	6	97	3	98	2
h. Other (Specify _____)	94	6	98	2	99	1

15. Earlier this year, before the harvest, did you receive mail or phone calls from workers you had employed in the past asking about crop status, working conditions, or housing for this year's harvest? (Circle one number)

68% YES
32 NO
(N = 242)

16. One of the costs of harvesting caneberries is complying with the reporting requirements of the 1986 Immigration Reform and Control Act (IRCA). About how many I-9 forms were completed and approved for this year's workers, and how many were rejected?

	<u>MEAN NUMBER</u>	<u>RANGE</u>
a. I-9 forms completed and approved	59.7	0 - 900
b. I-9 forms rejected	8.1	0 - 400

17. Who usually supervised the completion of an employee's I-9 form, was it you, a family member or a hired employee? (Circle one number)

83% YOU OR A FAMILY MEMBER

14 HIRED EMPLOYEE

3 BOTH

(N = 183)

- 17a. What is the hourly wage rate of this hired employee? Do not include benefits or payroll costs.

MEAN = \$7.00 EMPLOYEE'S HOURLY WAGE RATE

RANGE = \$4.25 - \$15.00

18. From your experience, about how many minutes does it take to complete and verify one I-9 form?

MEAN = 9.92 MINUTES TO COMPLETE ONE I-9

RANGE = 2.0 - 33.0

19. Did you pay your workers an hourly wage or by piece-rate?

33% HOURLY WAGE

50 PIECE-RATE

27 BOTH

(N = 240)

- 19a. What percentage of your workers, if any, could not make minimum wage on a piece-work basis?

MEAN = 24.25 PERCENT OF WORKERS

RANGE = 0 - 100

- 19b. How many workers, if any, were terminated because they could not earn enough to make minimum wage?

MEAN = 1.81 NUMBER OF WORKERS TERMINATED

RANGE = 0 - 40

20. Did you lose any portion of a caneberry crop due to a lack of documented labor in 1989 or 1990? (Circle one number)

85% NO

15 YES

(N = 279)

- 20a. How many acres of caneberries did you lose?

MEAN = 2.82 NUMBER TOTAL ACRES LOST

RANGE = 0.3 - 10

- 20b. And, what is your estimate of the value of the caneberries you lost?

MEAN = \$6,330 ESTIMATED VALUE OF CROP LOST

RANGE = \$182 - \$40,000

21. Finally, what is your major concern for the 1991 harvest?

%

a. Market price	46
b. Worker availability	42
c. Minimum wage law	25
d. Paper work	15
e. Weather, pests	14
f. Government Regs.....	9

Total	<u>151</u>
(N)	(209)

APPENDIX B. SUMMARY OF COMPLETION RATES

Names and addresses of all known commercial caneberry growers in the state were provided by the Oregon Caneberry Commission. A total of 719 names were available for contact. An eligible respondent was defined as a grower who had harvested at least one acre of caneberries for processing in 1990. A total of 39 names were discarded because they were ineligible. The sample was stratified into three groups: 1) growers who had operated 40 acres or more (N = 76); growers who had operated 10 to 39.9 acres (N=224); and a random half of growers who had operated less than 10 acres (N = 190). The total sample was 490.

Three waves of mail questionnaires and one telephone contact were made.

Results of the contacts were:

	<u>Small</u>	<u>Medium</u>	<u>Large</u>	<u>Total</u>
Returned	81	111	41	233
No berries raised in 1990	11	4	1	16
No commercial berries raised in 1991 .	7	0	0	7
Undeliverable	6	4	1	11
Duplicates	1	2	0	3
Quit farming	2	0	0	2
Refused	0	1	2	2
Not returned	<u>82</u>	<u>101</u>	<u>31</u>	<u>214</u>
Total	190	224	76	490

An overall adjusted completion rate of 52 percent was achieved, after non-growers and other ineligible were subtracted from the base. Adjusted rates for small growers were 50%, for medium growers, 52% and for large growers, 55%.

A random subsample of 50 names and addresses was drawn from the group that had not responded. (Twenty were for growers with large acreages, the remainder for medium and small-acreage growers. A telephone interview was completed to determine if respondents met our definition of an eligible grower. If they had, they were mailed a questionnaire and asked to complete and return it to the Center.

An adjusted completion rate, based on the results of the telephone interviews and returned mail questionnaires, increased our completion rate overall to 56 percent -- 56 percent for small and medium-acreage growers, 57 percent for growers who operated large acreages of caneberries.

APPENDIX C. ESTIMATION OF THE SIZE AND PRODUCTIVITY FOR THE WORK FORCE OF HAND PICKERS

Direct measures of the size and productivity of the work force of hand pickers was not possible from the data available. Methods used for estimation of these measures are described in this appendix.

Sampling weights

Two sampling strata were formed for the caneberry farms. One stratum consisted of the large and medium sized farms and was 100 percent sampled and the other stratum (small farms) was 50 percent sample. Each farm in the small-farm stratum sample then represents two farms in that stratum population. Thus the numbers of workers, acres harvested, and pounds harvested were all weighted by the factor 2 for small farms in the estimation of size of the work force.

Size of the work force of hand pickers

The sample respondents (n=232) were classified into three harvest-type strata: hand picking only (n=100), machine harvest only (n=87), and mixed hand picking and machine harvest (n=44). From the 100 pure hand picking farms only 54 of the farms provided sufficient information for the calculations that follow.

First, the number of workers for each farm is estimated as the ratio of the number of worker days required to harvest the crop (product of Questions 6 and 7) divided by the average number of working days per worker. The average number of working days per worker is calculated as the sum of products of the midpoints¹ of intervals for picking days and the corresponding proportion of workers in each interval (Questions 8a-8d). Next, the number of workers is multiplied by the worker-type proportions (Questions 13a-13d). The resulting number of workers of each type (locals 12-16 years old, etc.) are summed over the 54 farms in the pure hand picking for which the numbers of pickers could be evaluated. Finally, these sample totals are adjusted to the population level by multiplying them by the expansion factor 4.8635 derived as the product of two expansion factors. The first expansion factor is the ratio of the total hand picked acreage (2,086) from the 100 pure hand picking farms and the 44

¹/ Midpoints employed were: for Q7a, 2; for 7b, 5.5; for 7c, 10.5;
and for 7d, $((Q6-15)/2) + 15$

mixed harvest farms to the acreage (734.3) in the 54 farms in the evaluation group. The second expansion factor is calculated as the ratio of the total harvest acreage (6,374.3) represented by the 232 respondents to the total acres harvested (10,910) in the population. Thus, the estimated work force for the 54 farms in the evaluation group were expanded by $(2,086.5/734.3)(10,910/6,374.3) = 4.8635$. The resulting estimates for the 1990 work force are presented in Table 1, page 2.

Productivity of the work force of hand pickers

The estimated average productivity of all pickers on a farm is found by dividing the pounds harvested (Question 3) by the estimated number of pickers on the farm. Such direct productivity estimates cannot be found by type of worker since pounds harvested are not segregated by worker type. In order to estimate productivity by type of worker, those growers (n=44) using only hand pickers and who reported that more than 50 percent of their crop was harvested by one type of worker (locals 12 – 16 years old, locals over age 16, U.S. migrants, or alien migrants) were used. Appendix Table C1 gives the distribution of worker types within the worker-type strata. Workers representing the "pure" type of their respective stratum were well above the 50 percent cutoff, with values ranging from 66 percent for the U.S. migrant stratum to 88 percent for the local age 12-16 stratum.

Direct productive estimates for those farms that employed more than one type of worker would treat all worker types on the farm equally productive. Regression analyses were used to adjust the direct estimates for those farms that employed more than one type of worker. We found that two variables indicative of picking conditions: Y=crop yield measured as pounds harvested per acre, and D= density of pickers measured as pickers per acre were found to have statistically significant (p-value<0.0001) regression coefficients in the regression equation

$$\log(P) = a_i + b_1 Y + b_2 D + e ,$$

where P denotes the productivity of all workers on a farm, $\log(P)$ a logarithmic transformation of P, a_i the stratum – dependent intercepts, $b_1 (>0)$ and $b_2 (<0)$ the regression of coefficients of Y and D respectively, and e is the residual term. This regression equation produced the coefficient of variation of 82 % ($R^2 = .82$) for the stratified subsample of 44 farms. Let \hat{P}_i denote regression prediction of productivity for type- i workers on a farm with predictor values Y and D, and P the direct productivity

of all workers on the farm. The productivity of type $-i$ workers on a farm in stratum i is calculated as the ratio estimator

$$P_i = P \left(\frac{\hat{P}_i}{\sum_{j=1}^4 \hat{P}_j (N_j/N)} \right),$$

where the productivity estimate for all workers on the farm (P) is adjusted by the factor formed from the predicted productivity for type $-i$ workers divided by the predicted productivity of all workers on the farm. Here, N_i denotes the number of type $-i$ workers on the farm and N the total workers of all types. Note that no adjustment results ($P_i = P$) for pure worker-type farms ($N_i = N$). These worker-type specific estimates, P_i , were averaged over the farms within the corresponding worker-type stratum to give the productivity values reported in Table 3. These worker-type specific productivity estimates deviated from the corresponding direct productivity estimates for all combined worker types by less than 11.4 percent in each of the strata.

APPENDIX TABLE C1. Distribution of worker-type in each of the sample strata for the 1990 Survey of Oregon Caneberry Growers

Type of worker in sample	Workers selected by group			
	50% > Locals 12-16 years old	50% > Locals over 16 years	50% > U.S. migrant	50% > Alien migrants
	%	%	%	%
Locals 12-16 years old	71	11	3	2
Locals over 16 years	10	88	22	6
U.S. migrants	0	1	66	18
Alien migrants	19	0	9	74
Total	100	100	100	100
(Number of workers)	(446)	(195)	(576)	(3,027)
(Number of growers reporting)	(8)	(7)	(5)	(24)