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## PRELIMINARY EVALUATION OF 180 TOMATO CULTIVARS IN THE MONAGAS STATE OF VENEZUELA

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### ABSTRACT

Two unreplicated tests were established to evaluate the performance of 180 tomato cultivars. The first test included 95 cultivars grown during the August-December 1981 season. Prior to the first harvest, all the entries were rated for the severity of Bacterial Spot Early Blight, Septoria Leaf Spot and Tobacco Mosaic Virus. In each of the six harvests, the fruits were separated in small and commercial and then counted and weighed. Yield of commercial fruits above 25 mt/ha were observed in the cultivars: Arizona, AT 70/24, CL-143-0-1-0-3, CL-1095, Campbell 1327, Campbell 34, Castlehy 1034, Castlex 489 G, Early Castlepeel, Harvester, Hessoline, Mexico, Nuova Super Roma, MH 134 E, Peto 98, Porfidio, Romanova, Rossol and Royal Chico. The second test was established from September 1981 to February 1982. It included 85 cultivars and only the yield data were recorded. Yields above 25 mt/ha were obtained with the cultivars Burgis, Castlex 489 G, Enterpriser, Floradade, Floradel, Hayslip, Piacenza, T2 IMP VF, Triumph, the lines XC-8104, CX-8105, E-6209, E 9209 from Campbell Institute, L-495 and L 550 from Louisiana State University and three crosses from Auburn University named GL-01, GL-03 and GL-04. Data of disease indexes on the first test and fruit firmness in both tests are presented.

### INTRODUCTION

Tomatoes are the main vegetable crop grown in Venezuela. They are used directly in the diet and as an industrial commodity. In the Monagas state, 260 ha were harvested during 1980, which represented less than 5% of the area harvested nationally. The production is located along the valleys of the Guarapiche, Aragua and Colorado rivers. Small areas are grown in other parts of the state.

The cultivars used by the growers include Napoli VF, Río Grande, Roma VF, Manalucie, Walter, VF 198 and a local selection of indeterminate growth and fruit shape varying from pear to oblate. Every year new varieties are sold by the seed distributors, without studying their adaptation to local conditions.

The damage caused by diseases, mainly Early Blight and Tobacco Mosaic Virus, limits the yield potential of the cultivars grown. Early Blight

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can be managed with the use of fungicides if the climatic conditions are not severe; when TMV occurs it can cause a great yield reduction.

The evaluation of cultivars has been the most studied aspect of the tomato in the Monagas state. Until 1980 around 50 cultivars have been introduced and tested by the Universidad de Oriente and the Centro de Investigaciones Agropecuarias. In an experiment with seven varieties, fruit yield between 28 and 38 mt/ha was obtained with Homestead FM 61, Chico III and Roforto VFN (Ohep, 1977). In another locality, Ortega (1981) and Rodríguez (1981) obtained the highest total yields with the cultivars Floralou (11,4 mt/ha) and Walter, respectively, while greater early yields were observed with Rio Grande and VF 198. The results of other experiments, indicate that with the use of proper plant density and irrigation practices, the yields of Roma VFN and Royal Ace can be as high as 35 and 45 mt/ha, respectively (Mata, 1977 and Rodulfo, 1977).

The characteristics frequently studied in the cultivar evaluation tests, were plant growth, earliness and fruit yield. In 1981, a project was started in the Guarapiche valley which also considered the severity of diseases and fruit quality (Ohep, 1977). This paper includes the results obtained in two tests started in 1981.

## **MATERIALS AND METHODS**

### **First Experiment**

The test was conducted during the August-December period. Ninety five cultivars from France, Italy, Nigeria, Taiwan and the United States were included (Table 7). Twenty five seedlings of each cultivar were transplanted in a 10 m row.

Prior to the first harvest, each entry was rated for the severity of Early Blight (EB), Tobacco Mosaic Virus (TMV), Bacterial Spot (BS), and Septoria Leaf Spot (SLS). Five plants of each plot were rated using the same scale for EB and SLS and different ones for BS and TMV (tables 3 and 7). The fruits were harvested in the mature green to red stage six times during one month. The culls were counted and discarded, and the rest were separated in commercial and small, then counted and weighed. A sample of five red fruits was taken from the third and fourth harvests for the firmness test. Each fruit was hand pressed and assigned a value according to the following scale: 1=very soft (cracked), 2=soft (deformed without cracking), 3=medium (slight deformation), 4=firm (no deformation) and 5=very firm (no deformation even under greater pressure). The fruits were also classified by their shape (Figure 1) and the plant growth habit recorded (indeterminate and determinate). A correlation analysis was carried out with the data of commercial fruit yield and the disease indexes.

## Second Experiment

This was established in another plot of the field used in the first experiment. Eighty five cultivars introduced from Canada, France, Hawaii, Italy, The Netherlands, and the United States were included (Table 8). The procedure followed was the same described for the other experiment, except that the disease rating was not carried out.

## RESULTS AND DISCUSSION

There is a great variation among the tomato genotypes available, due to its early world distribution and the breeding work carried out worldwide. This was observed in the results obtained with the 180 cultivars tested.

Commercial fruit yield ranged from 5.491 to 32.000 kg/ha in the first test and from 11.250 to 32.813 in the second one (Tables 7 and 8). Thirty seven cultivars yielded above 25 mt/ha (Tables 1 and 5) and these are selected for further evaluation. This group includes cultivars originally bred for the fresh market and others for processing. They can be all grown for the fresh market, since in Venezuela both types of tomatoes are consumed directly. Only those entries with small fruits (Harvester, Peto 98, Piacenza and the CL lines from Taiwan) are not suitable for the fresh market. Since no processing quality analyses were carried out in these tests, those cultivars developed for processing and with high yield observed, can be considered for this purpose. All the entries with commercial yield above 25 mt/ha, had not been tested or grown commercially in the Monagas state.

Tomatoes are marketed in Venezuela packed in wood boxes of 40 kg capacity. Fruit loss up to 25% has been recorded (Linarez, 1979), mainly because of fruit softness. For this reason fruit firmness was rated among the entries. Forty eight cultivars had fruits medium to very firm (Table 2 and 6). Some of these cultivars were also included in the group of high commercial yield. The use of cultivars with those two characteristics, may allow a greater offer to the market without increasing the production area. More tomatoes can be produced and less are lost in transit to the market.

During the growing season tomatoes are frequently affected by several diseases. In the tests, EB and TMV occurred in greater extent than BS and SLS. Fusarium Wilt and Southern Blight appeared in few plants. In the first experiment 11 cultivars had low values of TMV index and 17 of Early Blight (Table 3). A negative significant correlation coefficient between TMV index and commercial fruit yield suggested that low yield is associated with the presence of the disease. Observations made during three years by the authors indicate that if TMV symptoms appear before fruit set, yield is greatly reduced. The use of TMV tolerant cultivars may overcome this problem.

The results obtained in these tests indicate the possibility of obtaining high fruit yield with cultivars not previously used in the Monagas state. Further evaluation of the outstanding cultivars will continue during both the dry and the rainy seasons in order to study their performance under the growing conditions of the Monagas state.

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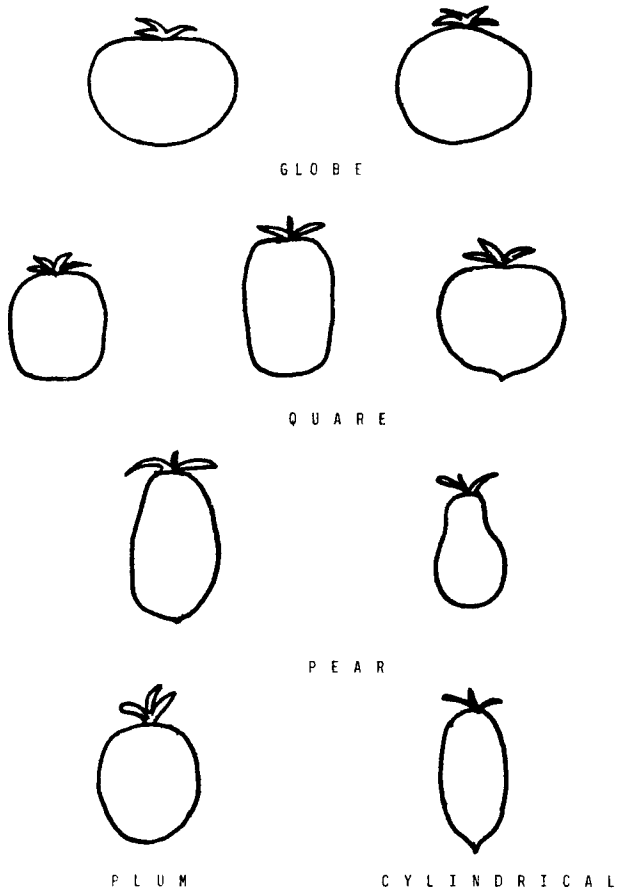


FIGURE 1. TOMATO FRUIT SHAPES CONSIDERED IN THE CULTIVAR TESTS OF 1981.

TABLE 1. CHARACTERISTICS OF THE HIGH YIELDING TOMATO CULTIVARS INCLUDED IN THE FIRST TEST OF 1981.

| NAME                          | COMMERCIAL       |                    | FRUITS   |        | PLANT<br>GROWTH |
|-------------------------------|------------------|--------------------|----------|--------|-----------------|
|                               | YIELD<br>(kg/ha) | AVERAGE<br>WT. (g) | FIRMNESS | SHAPE  |                 |
| CL 1094 - F <sub>5</sub> - 57 | 28.304           | 68                 | 1,2      | GLOBE  | C               |
| NUOVA SUPER ROMA              | 30.113           | 46                 | 3,0      | PEAR   | D               |
| ARIZONA                       | 28.717           | 55                 | 4,0      | PLUM   | D               |
| MEXICO                        | 30.139           | 62                 | 3,4      | PLUM   | D               |
| PORFICO                       | 25.909           | 54                 | 3,0      | PLUM   | D               |
| HESSLINE                      | 26.111           | 45                 | 1,4      | PEAR   | D               |
| RIFSOLO                       | 31.213           | 49                 | 1,8      | PEAR   | D               |
| ROMANOVA                      | 27.619           | 52                 | 2,4      | PEAR   | D               |
| CASTLEFRY 1034                | 25.789           | 121                | 1,6      | GLOBE  | I               |
| CASTLEX 489 G                 | 27.446           | 94                 | 3,4      | SQUARE | D               |
| HARVESTER                     | 31.250           | 42                 | 2,0      | PLUM   | D               |
| CAMPBELL 1327                 | 27.625           | 107                | 1,0      | GLOBE  | D               |
| PETO 98                       | 25.938           | 48                 | 3,8      | PLUM   | D               |
| CAMPBELL 34                   | 32.000           | 82                 | 1,8      | SQUARE | D               |
| EARLY CASTLEPEEL              | 27.005           | 61                 | 3,8      | PLUM   | D               |



TABLE 1. CONTINUATION .....

|                       |        |    |     |      |   |
|-----------------------|--------|----|-----|------|---|
| MH WF 131 E           | 27,697 | 54 | 3.8 | PLUM | F |
| AT 70 124             | 25,921 | 49 | 2.0 | PEAP | F |
| ROYAL CHICO           | 25,350 | 49 | 3.0 | PFAR | F |
| CL - 143 - 0 - 10 - 3 | 25,156 | 36 | 1.0 | PLUM | F |

TABLE 2. TOMATO CULTIVARS WITH HIGH VALUES OF FRUIT FIRNESS OBTAINED IN THE FIRST EXPERIMENT OF 1961.

| NAME             | FIRNESS * | NAME             | FIRNESS * |
|------------------|-----------|------------------|-----------|
| NUOVA SUPER ROMA | 3,0       | ROYAL CHICO      | 3,0       |
| TODD ROYO        | 3,6       | C 38             | 5,0       |
| TANZIMECH        | 3,8       | CAL J            | 3,0       |
| ARIZONA          | 4,0       | PETOGRO          | 4,0       |
| MEXICO           | 3,4       | PETOMECH         | 3,8       |
| ROYAL BALL       | 3,6       | CASTLEMART       | 3,4       |
| AT 30            | 3,2       | CATLEHY 1017     | 3,4       |
| PORFIDO          | 3,0       | CAMPBELL 37A     | 3,4       |
| INTERMECH        | 3,8       | CASTLEX 489 G    | 3,4       |
| MERILAND         | 3,4       | CASTLESTAR E 77  | 3,2       |
| VF - 198         | 3,8       | CASTLELONG       | 4,2       |
| RIO GRANDE       | 3,8       | PETO 98          | 3,8       |
| VF - 134         | 4,4       | EARLY CASTLEPEEL | 3,8       |
| KS - 5715        | 3,6       | MH VF 134 E      | 3,8       |
| TRIUMPH          | 3,6       | VC 82 B          | 3,6       |
| LAURANO 70       | 3,8       | MH VF 6203       | 3,2       |
| BULL             | 4,0       | MH VF 3203       | 3,4       |

\*

1= VERY SOFT , 2= SOFT , 3= MEDIUM , 4= FIRM , 5= VERY FIRM

TABLE 1. - TOLERANCE OF TOBACCO WITH LOW SEVERITY INDEXES OF TOBACCO MOSAIC VIRUS AND EARLY BUDGET. 1950  
 (CONTINUED) (P. 195)

| NAME             | TMV INDEX * | NAME                 | EE INDEX ** |
|------------------|-------------|----------------------|-------------|
| CL 109-6-2-4     | 1,8         | CL 1561-6-6-22-4     | 1,8         |
| CL 1161-5-6-22-4 | 1,8         | ( 197 )              | 2,0         |
| CL 107-3         | 1,8         | INDIANA 73           | 2,0         |
| ROMA GIGANTE     | 1,8         | ROYAL BALL           | 2,0         |
| ROMANOV4         | 1,4         | NEVADA               | 2,0         |
| CL 38            | 1,8         | SIRJO                | 1,8         |
| CASTLEHY 1034    | 2,0         | ROMA GIGANTE         | 2,0         |
| CASTLEHY 109     | 1,8         | HEINZ 1370           | 1,8         |
| HARVESTER        | 1,6         | UC 105 J             | 1,6         |
| PELICAN          | 1,6         | CASTLEHY 1017        | 2,0         |
| EARLY CASTLEPEEL | 1,6         | <b>CASTELHY 1050</b> | 2,0         |
|                  |             | CAMPBELL 37 A        | 2,0         |
|                  |             | HARVESTER            | 1,6         |
|                  |             | SUNRAY               | 2,0         |
|                  |             | PELICAN              | 2,0         |
|                  |             | EARLY CASTLEPEEL     | 1,6         |

\* TMV= TOBACCO MOSAIC VIRUS. 0= NO SYMPTOMS OBSERVED. 1= TOP 1/3 OF THE PLANT WITH SYMPTOMS, 2= TOP 1/3 AND MEDIUM 1/3 OF THE PLANT WITH SYMPTOMS, 3= ALL PLANT WITH SYMPTOMS AND 4= ALL PLANT WITH SYMPTOMS AND STUNTED.

\*\* EE= EARLY BUDGET. 1= NO SYMPTOMS OBSERVED, 2= 1 TO 5 % OF FOLIAR AREA WITH LESIONS, 3= 5 TO 25 % OF FOLIAR AREA WITH LESIONS, 4= 25 TO 50 % OF FOLIAR AREA WITH SYMPTOMS AND 5= MORE THAN 50 % OF FOLIAR AREA WITH SYMPTOMS.

Table 4.--Regression Coefficients Obtained Between the Yield of Commercial Fruits (YCF) and the Severity Indexes of Tobacco Mosaic Virus, Early Blight, Bacterial Spot and Septoria Leaf Spot

|     | TMV     | E B     | B S    | SLS     |
|-----|---------|---------|--------|---------|
| YCF | -0,2755 | -0,0003 | 0,0226 | -0,1621 |

Table value for N = 95 and p = 0,05 = 0,1946.

TABLE 5. CHARACTERISTICS OF THE HIGH YIELDING TOMATO CULTIVARS INCLUDED IN THE SECOND TEST OF 1981.

| NAME          | COMMERCIAL       |                    | FRUITS   |         | PLANT<br>HEIGHT<br>(cm.) |
|---------------|------------------|--------------------|----------|---------|--------------------------|
|               | YIELD<br>(kg/ha) | AVERAGE<br>WT. (g) | FIRMNESS | SHAPE   |                          |
| FLORADEL      | 26.250           | 117                | 1,8      | GLOBE   | I                        |
| T2 THP VI     | 30.724           | 70                 | 3,8      | SQUARE  | D                        |
| BURGIS        | 27.188           | 104                | 2,0      | GLOBE   | D                        |
| HAYSLIP       | 30.714           | 116                | 2,2      | GLOBE   | D                        |
| ENTERPRISER   | 33.824           | 88                 | 1,2      | GLOBE   | D                        |
| PIACENZA      | 25.875           | 32                 | 2,2      | CYLIND. | D                        |
| GL 01         | 28.385           | 115                | 2,6      | GLOBE   | I                        |
| GL 03         | 32.813           | 97                 | 1,6      | GLOBE   | D                        |
| GL 04         | 29.000           | 109                | 2,2      | GLOBE   | I                        |
| L - 495       | 25.197           | 73                 | 1,8      | PEAR    | I                        |
| L - 550       | 28.385           | 94                 | 2,4      | GLOBE   | D                        |
| CX - 8104     | 31.625           | 85                 | 2,8      | SQUARE  | D                        |
| CX - 0105     | 29.963           | 68                 | 2,6      | SQUARE  | D                        |
| E - 9209      | 26.364           | 63                 | 4,2      | SQUARE  | D                        |
| E - 6209      | 32.813           | 64                 | 3,8      | SQUARE  | D                        |
| CASTLEX 489 G | 27.000           | 88                 | 4,0      | SQUARE  | D                        |
| TRIUMPH       | 33.750           | 69                 | 3,2      | PLUM    |                          |

TABLE 6. TOMATO CULTIVARS WITH HIGH VALUES OF FRUIT FIRNESS OBTAINED IN THE SECOND EXPERIMENT OF 1981.

| NAME       | FIRNESS* | NAME                     | FIRNESS* |
|------------|----------|--------------------------|----------|
| MACISTE    | 3,6      | E - 6203                 | 3,8      |
| VF 198     | 3,4      | GS - 22 - F <sub>1</sub> | 3,8      |
| T 2 IMF VF | 3,8      | FLORADADE                | 3,8      |
| CX - 806   | 3,2      | KEWALO                   | 3,0      |
| CX - 8101  | 3,4      | BOONYCE                  | 3,4      |
| CX - 8102  | 4,2      | OHIO 7880                | 3,8      |
| CX - 80 11 | 3,8      | TRIUMPH                  | 3,2      |

\* 1= VERY SOFT, 2= SOFT, 3= MEDIUM, 4= FIRM and 5= VERY FIRM

TABLE 7. CHARACTERISTICS OF THE TOMATO CULTIVARS EVALUATED IN THE FIRST EXPERIMENT OF 1981.

| NAME                       | fruit yield (kg/ha) |       | total  | average wt. (g) | fruit firmness <sup>2</sup> (N <sup>2</sup> ) | disease EB <sup>3</sup> | severity BS | indices SLS | fruit stage | fruit quality |
|----------------------------|---------------------|-------|--------|-----------------|---|-------------------------|-------------|-------------|-------------|---------------|
|                            | commercial          | small |        |                 |   |                         |             |             |             |               |
| CL-0-0-01                  | 11.920              | 3.348 | 15.268 | 59              | 1.0   | 3.6                     | 4,4         | 2,2         | 1,0         | GI            |
| CL-113-0-10-3              | 25.156              | 6.520 | 31.676 | 36              | 1.0   | 2,4                     | 2,6         | 2,2         | 1,2         | PI            |
| CL-123-2-4                 | 15.700              | 2.675 | 18.375 | 56              | 1.6   | 1,8                     | 2,4         | 1,2         | 1,0         | PI            |
| CL-1561-6-0-22-4           | 17.074              | 3.381 | 20.455 | 45              | 1.0   | 1,6                     | 1,8         | 3,0         | 3,2         | PI            |
| CL-1591-5-0-1-6            | 23.500              | 2.200 | 25.700 | 62              | 1.0   | 3,0                     | 2,8         | 1,0         | 2,0         | GI            |
| CL-1591-5-0-1-7            | 13.450              | 2.700 | 16.150 | 61              | 3.0   | 2,8                     | 2,0         | 1,2         | 1,2         | GI            |
| CL-1094-F <sub>5</sub> -57 | 28.304              | 2.946 | 31.252 | 62              | 1.2   | 3,4                     | 3,4         | 1.0         | 1,6         | GI            |
| CL-1094-F <sub>5</sub> -88 | 9.701               | 2.120 | 11.821 | 72              | 1.2   | 3,0                     | 3,6         | 1,6         | 2,0         | GI            |
| ( 1 )                      | 15.435              | 4.565 | 20.000 | 48              | 1.0   | 3,0                     | 4,2         | 2,0         | 1,2         | GI            |
| ( 367 )                    | 21.809              | 2.270 | 24.079 | 60              | 1.0   | 1,6                     | 2,0         | 1,2         | 1,0         | GI            |
| AT 70/24                   | 25.921              | 3.224 | 29.145 | 49              | 2.0   | 2,2                     | 2,4         | 1,4         | 1,0         | P             |
| INDIANA 73                 | 21.845              | 2.381 | 24.226 | 49              | 2.8   | 2,6                     | 2,0         | 1,4         | 1,0         | P             |
| NUOVA SUPER ROMA           | 30.313              | 1.761 | 31.874 | 46              | 3.0   | 3,0                     | 4,0         | 1,6         | 1,8         | P             |
| NUOVA PERLITA              | 13.157              | 2.533 | 15.690 | 62              | 2.2   | 2,6                     | 2,8         | 1,0         | 1,0         | P             |
| SUPER CALIFORNIA           | 20.925              | 2.175 | 23.100 | 46              | 1.8   | 3,8                     | 4,8         | 2,2         | 4,8         | P             |
| TORO ROYO                  | 20.069              | 1.875 | 21.944 | 77              | 3.6   | 2,0                     | 2,4         | 1,4         | 1,0         | S             |
| CLINTON                    | 15.462              | 1.984 | 17.446 | 67              | 2.8   | 2,6                     | 3,0         | 1,4         | 1,0         | S             |
| TANZIMECH                  | 22.935              | 3.125 | 28.060 | 52              | 3.8   | 3,4                     | 4,4         | 2.0         | 1,0         | PI            |
| ARIZONA                    | 28.717              | 2.895 | 31.612 | 55              | 4.0   | 3,2                     | 4,0         | 1.8         | 1,0         | PI            |
| MEXICO                     | 30.139              | 2.083 | 32.222 | 62              | 3.4   | 2,4                     | 2,6         | 1.0         | 2,4         | PI            |
| ROYAL BALL                 | 11.657              | 469   | 12.126 | 100             | 3.6   | 2,2                     | 2,0         | 1.0         | 1,8         | GI            |

TABLE 7. CONTINUATION .....

|                   |        |       |        |     |     |     |     |     |     |    |   |    |
|-------------------|--------|-------|--------|-----|-----|-----|-----|-----|-----|----|---|----|
| ROMANOVA          | 27,619 | 2,083 | 29,702 | 52  | 2,4 | 1,4 | 2,4 | 1,2 | 2,0 | P  | D | 9  |
| ERIDIANO          | 11,089 | 970   | 12,059 | 46  | 2,2 | 3,8 | 3,4 | 1,0 | 3,8 | P  | D | 9  |
| C 38              | 9,954  | 1,643 | 11,597 | 55  | 5,0 | 1,8 | 3,0 | 2,2 | 1,6 | PL | D | 9  |
| CAL J             | 18,382 | 3,170 | 21,552 | 54  | 3,0 | 3,6 | 4,4 | 1,8 | 1,0 | PL | D | 10 |
| PETOGRO           | 19,674 | 1,276 | 20,950 | 54  | 4,0 | 2,2 | 2,6 | 1,6 | 1,0 | PL | D | 10 |
| VENTURA           | 19,266 | 3,533 | 22,799 | 50  | 2,8 | 3,0 | 3,2 | 3,0 | 1,2 | P  | D | 10 |
| PETOMECH          | 11,994 | 2,470 | 14,464 | 57  | 3,8 | 3,8 | 3,4 | 1,6 | 1,0 | PL | C | 10 |
| EUROPEEL          | 24,042 | 3,083 | 27,125 | 44  | 2,0 | 3,2 | 2,4 | 1,4 | 1,2 | P  | D | 10 |
| CASTLEHY 1034     | 25,789 | 853   | 26,664 | 121 | 1,6 | 2,0 | 2,4 | 1,4 | 1,0 | GL | I | 11 |
| CASTLEHY 105      | 23,375 | 1,020 | 24,395 | 131 | 2,2 | 1,6 | 2,2 | 1,2 | 1,0 | GL | I | 11 |
| CASTLEWART        | 9,910  | 179   | 10,089 | 88  | 3,4 | 2,8 | 2,6 | 1,0 | 1,6 | CD | D | 11 |
| CASTLEHY 1017     | 24,716 | 2,784 | 27,500 | 90  | 3,4 | 2,6 | 2,0 | 1,2 | 2,6 | CD | I | 11 |
| CASTLEHY 1204     | 13,690 | 774   | 14,464 | 49  | 2,4 | 3,0 | 2,8 | 1,0 | 1,6 | CL | D | 11 |
| CASTLEHY 1050     | 21,603 | 1,250 | 22,853 | 120 | 2,2 | 2,2 | 2,0 | 1,8 | 1,0 | P  | I | 11 |
| CASTLEHY 1035     | 19,531 | 2,760 | 22,291 | 136 | 1,6 | 2,0 | 1,8 | 1,4 | 1,0 | GL | D | 11 |
| CAMBELL 37A       | 14,480 | 2,163 | 17,053 | 63  | 3,4 | 2,6 | 2,0 | 1,8 | 1,4 | S  | D | 11 |
| CASTLEX 489-6     | 27,446 | 1,461 | 28,907 | 94  | 3,4 | 3,0 | 2,8 | 1,2 | 1,6 | S  | D | 11 |
| CASTLE STAR E-77  | 20,347 | 1,701 | 22,048 | 61  | 3,2 | 2,6 | 2,4 | 1,2 | 1,4 | CL | D | 11 |
| CASTLE LONG       | 9,275  | 1,025 | 10,300 | 54  | 4,2 | 3,8 | 3,2 | 1,2 | 2,0 | CL | D | 11 |
| FLORENCE          | 9,643  | 1,488 | 11,131 | 109 | 1,6 | 2,0 | 2,4 | 1,4 | 1,0 | GL | D | 11 |
| RONITA            | 17,625 | 1,187 | 18,812 | 50  | 1,6 | 3,8 | 4,4 | 1,0 | 3,8 | F  | D | 12 |
| LA BONITA         | 24,700 | 2,407 | 27,107 | 46  | 2,4 | 3,2 | 2,6 | 1,8 | 2,0 | PL | D | 12 |
| HARVESTER         | 31,250 | 2,796 | 34,046 | 42  | 2,0 | 1,6 | 1,8 | 1,0 | 1,0 | F  | D | 12 |
| PONDEROSA         | 5,491  | 179   | 5,070  | 171 | 1,2 | 3,2 | 2,6 | 1,4 | 1,0 | GL | I | 13 |
| RUTGERS 885-39 VF | 22,600 | 1,458 | 24,058 | 100 | 1,2 | 3,0 | 2,6 | 1,2 | 1,4 | GL | I | 13 |
| CAMBELL 1327      | 27,625 | 1,937 | 29,562 | 107 | 1,0 | 3,4 | 2,8 | 1,2 | 1,0 | GL | D | 13 |



TABLE 7. CONTINUATION .....

|              |        |       |        |     |     |     |     |     |     |    |   |   |
|--------------|--------|-------|--------|-----|-----|-----|-----|-----|-----|----|---|---|
| NEVADA       | 22,418 | 2,717 | 25,135 | 53  | 2,2 | 2,2 | 2,0 | 1,8 | 1,2 | S  | D | 7 |
| AT 30        | 13,566 | 2,206 | 15,772 | 60  | 3,2 | 3,2 | 2,8 | 1,4 | 1,0 | S  | D | 7 |
| VESUVIO      | 17,685 | 2,639 | 16,205 | 33  | 1,8 | 3,0 | 4,2 | 2,0 | 1,0 | P  | D | 7 |
| SIRIO        | 16,847 | 2,663 | 19,510 | 38  | 2,2 | 2,6 | 1,8 | 1,0 | 1,2 | P  | D | 7 |
| PORTO        | 25,909 | 2,045 | 27,954 | 54  | 3,0 | 3,6 | 4,4 | 1,0 | 4,8 | S  | D | 7 |
| MAREMA       | 18,462 | 1,706 | 20,168 | 55  | 2,6 | 3,0 | 4,6 | 2,2 | 1,0 | P  | D | 7 |
| INTERECH     | 18,750 | 3,320 | 22,070 | 60  | 3,8 | 3,2 | 3,0 | 1,4 | 1,0 | PL | D | 7 |
| MERLAND      | 16,920 | 1,211 | 18,131 | 51  | 3,4 | 2,8 | 2,4 | 1,0 | 1,4 | S  | D | 7 |
| CALIFORNIA   | 12,593 | 1,969 | 14,562 | 51  | 1,6 | 3,4 | 3,6 | 1,0 | 1,8 | P  | D | 7 |
| ROMA GIGANTE | 23,206 | 951   | 24,157 | 55  | 1,2 | 1,8 | 2,0 | 1,6 | 1,0 | P  | D | 7 |
| ROMA V. F.   | 23,571 | 1,577 | 25,148 | 55  | 2,2 | 3,2 | 2,6 | 2,2 | 2,6 | P  | D | 7 |
| HEINZ 1370   | 21,730 | 2,019 | 3,749  | 110 | 1,4 | 2,2 | 1,8 | 1,2 | 1,0 | GL | D | 7 |
| VF - 198     | 13,317 | 2,692 | 16,009 | 57  | 3,8 | 3,8 | 3,0 | 1,8 | 1,0 | S  | D | 7 |
| RIO GRANDE   | 21,597 | 1,551 | 23,148 | 66  | 3,8 | 3,4 | 3,8 | 2,0 | 1,2 | PL | D | 7 |
| TEIDE VERANO | 17,784 | 2,273 | 20,057 | 45  | 1,8 | 3,4 | 4,4 | 2,0 | 1,2 | P  | D | 7 |
| VF - 134     | 19,375 | 1,219 | 20,594 | 58  | 4,4 | 2,8 | 2,6 | 1,4 | 1,0 | PL | D | 7 |
| HESSOLINE    | 26,111 | 3,472 | 29,583 | 45  | 1,4 | 4,0 | 4,2 | 1,0 | 4,8 | P  | D | 7 |
| ROSSOL       | 31,213 | 2,058 | 33,271 | 49  | 1,8 | 2,2 | 2,0 | 1,2 | 1,0 | P  | D | 7 |
| HELLINE      | 14,250 | 2,725 | 17,025 | 51  | 1,0 | 3,4 | 2,8 | 1,6 | 1,0 | P  | D | 7 |
| MS - 5715    | 15,167 | 2,667 | 17,834 | 51  | 3,6 | 2,4 | 2,0 | 1,6 | 1,0 | S  | D | 7 |
| TRIUMPH      | 24,062 | 781   | 24,843 | 67  | 3,6 | 4,0 | 4,2 | 1,2 | 3,8 | PL | D | 7 |
| LAURANO 76   | 23,925 | 2,350 | 26,275 | 80  | 3,8 | 2,0 | 2,0 | 1,0 | 1,2 | S  | D | 7 |
| UC - 105 J   | 20,972 | 4,212 | 25,139 | 40  | 2,6 | 2,0 | 1,6 | 1,8 | 2,0 | GL | D | 7 |
| DENER        | 24,175 | 2,925 | 27,100 | 61  | 3,4 | 3,0 | 4,2 | 2,6 | 1,0 | P  | D | 7 |
| BULL         | 19,631 | 1,960 | 25,591 | 60  | 4,0 | 3,2 | 3,4 | 1,8 | 1,2 | PL | D | 7 |
| ROYAL CHICO  | 25,350 | 3,550 | 28,900 | 49  | 3,0 | 2,8 | 2,6 | 1,6 | 1,2 | P  | D | 7 |

TABLE 7. CONTINUATION .....

|                       |        |       |        |     |     |     |     |     |     |    |   |    |
|-----------------------|--------|-------|--------|-----|-----|-----|-----|-----|-----|----|---|----|
| NEW YORKER            | 19.352 | 2.870 | 22.225 | 72  | 1,2 | 4,0 | 4,2 | 2,2 | 1,8 | GL | D | 13 |
| HEIHZ 1350            | 9.167  | 750   | 9.917  | 120 | 1,0 | 3,2 | 3,0 | 1,2 | 1,2 | GL | D | 13 |
| FIREBALL              | 13.819 | 1.319 | 15.138 | 74  | 1,0 | 3,6 | 3,6 | 1,4 | 1,2 | GL | D | 13 |
| GLAMOUR               | 14.688 | 909   | 15.597 | 96  | 1,4 | 2,6 | 3,8 | 2,0 | 1,0 | GL | D | 13 |
| SUNRAY                | 11.302 | 781   | 12.084 | 97  | 1,2 | 3,2 | 2,0 | 1,4 | 1,0 | GL | D | 13 |
| WESTONER              | 9.750  | 605   | 10.355 | 127 | 1,2 | 2,6 | 2,6 | 1,1 | 1,0 | GL | D | 13 |
| CASTLEX VEN I         | 14.158 | 1.995 | 16.153 | 51  | 2,2 | 3,0 | 2,8 | 1,4 | 1,0 | P  | D | 11 |
| A U 76 FW             | 19.087 | 1.490 | 20.577 | 96  | 1,0 | 2,4 | 2,6 | 1,2 | 1,4 | GL | I | 14 |
| PELICAN               | 20.156 | 1.562 | 21.718 | 141 | 1,4 | 1,6 | 2,0 | 1,6 | 1,2 | GL | I | 15 |
| PETO 98               | 25.938 | 3.534 | 21.472 | 48  | 3,8 | 2,4 | 1,8 | 1,0 | 1,2 | PL | D | 16 |
| CAMPBELL 39           | 22.467 | 2.270 | 24.737 | 60  | 2,0 | 3,4 | 3,4 | 1,4 | 1,4 | S  | D | 16 |
| CAMPBELL 34           | 32.000 | 2.312 | 34.312 | 82  | 1,8 | 2,8 | 4,0 | 1,4 | 3,4 | S  | D | 16 |
| EARLY CASTLEPEEL      | 27.005 | 3.932 | 30.937 | 61  | 3,8 | 1,6 | 1,8 | 1,4 | 1,2 | PL | D | 16 |
| MH VF 134 E           | 27.687 | 2.219 | 29.906 | 54  | 3,8 | 3,2 | 5,0 | 1,2 | 5,0 | PL | D | 17 |
| UC 82 B               | 9.489  | 2.017 | 11.506 | 54  | 3,6 | 3,6 | 3,2 | 1,4 | 2,0 | PL | D | 17 |
| M H VF 6203           | 22.935 | 3.424 | 26.359 | 64  | 3,2 | 3,2 | 4,4 | 2,0 | 1,0 | PL | D | 17 |
| M H VF 3202           | 15.625 | 500   | 16.125 | 88  | 3,4 | 3,0 | 2,4 | 1,6 | 1,0 | PL | D | 17 |
| ACE 55 VF             | 11.153 | 0     | 11.153 | 150 | 2,2 | 3,6 | 3,8 | 1,0 | 3,4 | GL | D | 17 |
| TROPIC                | 10.736 | 465   | 11.201 | 98  | 1,6 | 4,0 | 4,0 | 1,0 | 2,4 | GL | D | 17 |
| FLORADEL              | 10.921 | 1.382 | 12.303 | 102 | 1,0 | 3,2 | 2,2 | 1,2 | 1,0 | GL | I | 17 |
| WALTER                | 15.083 | 2.167 | 17.250 | 104 | 1,0 | 2,8 | 2,2 | 1,2 | 1,0 | GL | D | 17 |
| SPRING GIANT BUSH F I | 16.600 | 2.275 | 18.935 | 96  | 1,4 | 2,8 | 2,2 | 2,2 | 1,6 | GL | D | 3  |

<sup>s</sup> see TABLE 9.

<sup>t</sup> I = indeterminate, D = determinate

Table 7. CONTINUATION .....

- U CL= cylindrical, GL= oblate, P= pear, PL= plum and S= square
- V SL= Septoria Leaf Spot caused by Septoria lycopersici . Scale similar to FB
- W BS= Bacterial Spot caused by Xanthomonas campestris p.v. vesicatoria . The scale used was 1= no visible symptoms, 2= lesions in the flower clusters, 3= lesions in the flower clusters and the stems, 4= lesions in the flower clusters, the stems and the leaves and 5= lesions in the flower clusters, the stems, the leaves and the fruits.
- X EB= Early Blight caused by Alternaria solani. For the scale see Table 3.
- Y TM= Tobacco Mosaic Virus. For the scale see Table 3.

TABLE 8. CHARACTERISTICS OF THE TOMATO CULTIVARS EVALUATED IN THE SECOND TEST OF 1981.

| NAME        | comercial | small | total  | average<br>wt. (g) | fruit<br>firmness <sup>z</sup> | fruit<br>shape <sup>y</sup> | plant<br>growth <sup>x</sup> | seed<br>source <sup>w</sup> |
|-------------|-----------|-------|--------|--------------------|--------------------------------|-----------------------------|------------------------------|-----------------------------|
| VF 13L - 34 | 21.181    | 1.875 | 23.056 | 62                 | 1,8                            | S                           | D                            | 18                          |
| ROFORTO VFN | 19.648    | 3.750 | 23.398 | 69                 | 2,4                            | P                           | D                            | 19                          |
| MACISTE     | 18.446    | 2.825 | 21.271 | 65                 | 3,6                            | S                           | D                            | 5                           |
| ROYAL CHICO | 16.042    | 1.550 | 17.592 | 68                 | 2,6                            | P                           | D                            | 20                          |
| ROME GIANT  | 20.685    | 6.150 | 26.835 | 46                 | 2,4                            | P                           | D                            | 19                          |
| MCEAST 22   | 17.656    | 875   | 18.531 | 84                 | 2,6                            | S                           | D                            | 6                           |
| MACERO 11   | 24.972    | 2.450 | 27.372 | 81                 | 2,2                            | S                           | D                            | 18                          |
| HESSOLINE   | 11.964    | 700   | 12.664 | 76                 | 2,2                            | P                           | D                            | 7                           |
| K S 866A    | 22.750    | 4.000 | 26.750 | 62                 | 2,6                            | S                           | D                            | 9                           |
| VF 198      | 17.763    | 4.425 | 22.188 | 65                 | 3,4                            | S                           | D                            | 9                           |
| MCEAST 22   | 20.134    | 2.400 | 22.534 | 73                 | 2,8                            | S                           | D                            | 9                           |
| MCEAST 55   | 23.125    | 3.250 | 26.375 | 70                 | 2,0                            | S                           | D                            | 9                           |
| T 2 1HP VF  | 30.724    | 4.950 | 35.674 | 70                 | 3,8                            | S                           | D                            | 9                           |
| VF 198      | 20.856    | 4.575 | 25.431 | 67                 | 2,6                            | S                           | D                            | 11                          |
| FLORADE     | 24.671    | 3.500 | 28.171 | 106                | 2,8                            | GL                          | D                            | 21                          |
| WALTER      | 17.604    | 1.400 | 19.004 | 103                | 1,2                            | GL                          | D                            | 21                          |
| FLORIDA MH  | 23.215    | 3.800 | 27.015 | 101                | 2,8                            | GL                          | D                            | 21                          |
| BURGIS      | 27.188    | 1.850 | 29.038 | 104                | 2,0                            | GL                          | D                            | 21                          |
| FLORADEL    | 26.250    | 2.950 | 29.200 | 107                | 1,8                            | GL                          | T                            | 21                          |
| CL 11 D     | 19.844    | 4.260 | 24.104 | 42                 | 2,4                            | GL                          | T                            | 21                          |

TABLE 8. CONTINUATION ....

|               |        |        |        |     |     |    |   |    |
|---------------|--------|--------|--------|-----|-----|----|---|----|
| MAYSLEIP      | 30.714 | 1.750  | 32.464 | 116 | 2,2 | GL | D | 21 |
| FLORIDA I A   | 21.333 | 1.175  | 22.503 | 117 | 2,4 | GL | D | 21 |
| FLORIDA I B   | 16.429 | 300    | 16.723 | 131 | 2,4 | GL | D | 21 |
| FLORIDA I C   | 22.344 | 525    | 22.869 | 137 | 2,6 | GL | D | 21 |
| ENTERPRISE    | 33.824 | 7.550  | 41.375 | 88  | 1,2 | GL | D | 12 |
| PIACENZA      | 25.875 | 10.375 | 26.250 | 32  | 2,2 | GL | D | 12 |
| GLANOUR       | 13.000 | 1.550  | 14.550 | 150 | 2,2 | GL | D | 13 |
| ROME VF       | 21.217 | 10.450 | 31.667 | 51  | 2,0 | P  | D | 13 |
| FLORADADE     | 27.537 | 2.650  | 30.187 | 131 | 2,4 | GL | D | 13 |
| CASTLEWART II | 12.067 | 1.175  | 13.242 | 116 | 1,8 | GL | D | 11 |
| GL 01         | 28.385 | 1.300  | 29.685 | 115 | 2,6 | GL | I | 14 |
| MS 81 - 10    | 22.411 | 3.500  | 25.911 | 106 | 1,6 | GL | I | 14 |
| MS 81 - 11    | 15.679 | 2.850  | 18.529 | 97  | 1,4 | GL | I | 14 |
| GL 03         | 32.813 | 2.875  | 35.688 | 97  | 1,6 | GL | D | 14 |
| FLORADEL      | 18.437 | 1.450  | 19.887 | 114 | 2,2 | GL | I | 14 |
| GL 04         | 29.000 | 4.725  | 33.725 | 109 | 2,2 | GL | I | 14 |
| FLORADADE     | 17.315 | 3.475  | 20.800 | 121 | 2,6 | GL | D | 11 |
| WALTER        | 19.135 | 3.350  | 22.485 | 94  | 2,8 | GL | D | 22 |
| L - 495       | 25.197 | 3.125  | 28.322 | 73  | 1,8 | P  | I | 15 |
| L - 562       | 20.500 | 3.550  | 24.050 | 94  | 1,4 | GL | I | 15 |
| L - 565       | 22.062 | 6.000  | 28.062 | 74  | 1,8 | GL | D | 15 |
| L - 563       | 23.314 | 5.025  | 28.339 | 109 | 2,2 | GL | I | 15 |
| L - 566       | 24.643 | 3.575  | 28.218 | 80  | 1,2 | GL | D | 15 |
| L - 577       | 20.833 | 1.875  | 22.708 | 104 | 1,4 | GL | I | 15 |
| L - 550       | 28.375 | 1.750  | 30.125 | 94  | 2,4 | GL | D | 15 |
| L - 517       | 20.500 | 1.850  | 22.350 | 64  | 2,0 | GL | D | 15 |
| L - 554       | 13.731 | 3.250  | 16.981 | 72  | 2,0 | GL | D | 15 |

TABLE 8. CONTINUATION. ....

|                        | 22,857 | 2,750 | 25,607 | 91  | 2,0 | 9  | 0 | 15 |
|------------------------|--------|-------|--------|-----|-----|----|---|----|
| L - 517                |        |       |        |     |     |    |   |    |
| L - 253                | 17,813 | 575   | 18,388 | 102 | 2,4 | GL | 1 | 15 |
| C X - 806              | 17,562 | 4,950 | 22,512 | 60  | 3,2 | S  | 0 | 16 |
| C X - 8102             | 17,280 | 7,100 | 24,380 | 66  | 3,4 | S  | 0 | 16 |
| C X - 8102             | 24,349 | 6,325 | 30,674 | 75  | 4,2 | S  | 0 | 16 |
| C X - 8103             | 19,706 | 4,250 | 23,956 | 67  | 3,8 | S  | 0 | 16 |
| C X - 8104             | 31,625 | 6,475 | 38,100 | 85  | 2,8 | S  | 0 | 16 |
| C X - 8105             | 29,963 | 8,125 | 28,088 | 68  | 2,6 | S  | 0 | 16 |
| C X - 8106             | 15,972 | 2,225 | 18,197 | 67  | 2,6 | S  | 0 | 16 |
| C X - 8011             | 24,210 | 6,875 | 31,085 | 52  | 3,8 | P  | 0 | 16 |
| C X - 8012             | 17,812 | 3,950 | 21,762 | 73  | 2,8 | S  | 0 | 16 |
| E - 9209               | 26,364 | 6,275 | 32,639 | 63  | 4,2 | S  | 0 | 16 |
| E - 6203               | 32,813 | 5,800 | 38,615 | 64  | 3,8 | S  | 0 | 16 |
| E - 9208               | 17,500 | 4,400 | 21,900 | 69  | 2,6 | S  | 0 | 16 |
| GS - 20 F <sub>1</sub> | 15,855 | 2,825 | 18,680 | 68  | 1,8 | S  | 0 | 16 |
| GS - 22 F <sub>1</sub> | 18,595 | 3,950 | 22,535 | 64  | 3,8 | S  | 0 | 16 |
| GS - 33 F <sub>1</sub> | 21,133 | 3,750 | 24,883 | 70  | 3,2 | S  | 0 | 16 |
| VF 145 7879            | 18,150 | 5,350 | 23,500 | 80  | 1,2 | GL | 0 | 15 |
| CASTLEX APP96          | 27,000 | 3,900 | 30,900 | 88  | 4,0 | S  | 0 | 16 |
| PATRIOT                | 17,499 | 975   | 18,474 | 113 | 2,2 | GL | 0 | 23 |
| HOMESTEAD              | 13,419 | 2,000 | 15,419 | 112 | 1,4 | GL | 1 | 23 |
| POPANUK                | 17,395 | 2,950 | 20,336 | 116 | 1,8 | GL | 1 | 23 |
| FLORADADE              | 27,344 | 2,500 | 29,894 | 112 | 3,8 | GL | 0 | 23 |
| YEWALO                 | 22,093 | 5,100 | 27,183 | 116 | 3,0 | GL | 1 | 24 |
| HEALANT                | 21,458 | 1,900 | 23,358 | 86  | 2,4 | GL | 1 | 24 |
| PEEPLY                 | 17,777 | 1,675 | 19,402 | 77  | 2,2 | FL | 0 | 23 |

TABLE 8. CONTINUATION.....

|              |        |       |        |     |     |    |   |    |
|--------------|--------|-------|--------|-----|-----|----|---|----|
| CAMPBEL 28   | 17.761 | 775   | 18.536 | 119 | 2.0 | GL | D | 25 |
| HEINZ 1706   | 11.250 | 2.000 | 13.250 | 63  | 2.8 | P  | D | 25 |
| BOONYUCE     | 9.018  | 475   | 9.493  | 84  | 3.4 | GL | D | 25 |
| EARLY BRIGHT | 10.781 | 1.075 | 11.856 | 78  | 2.0 | GI | D | 25 |
| OH 10 7663   | 15.904 | 6.075 | 21.979 | 57  | 2.4 | S  | D | 26 |
| OH 10 7880   | 15.125 | 5.125 | 20.250 | 70  | 3.8 | S  | D | 26 |
| OH 10 7681   | 19.519 | 3.350 | 22.869 | 87  | 2.4 | S  | D | 26 |
| ROMA 200     | 17.325 | 4.975 | 22.300 | 58  | 2.8 | S  | D | 6  |
| TRIUMPH      | 33.750 | 4.375 | 38.125 | 69  | 3.2 | PL | D | 8  |

u See Table 9.

y I= indeterminate, D= determinate

Y (L= cylindrical, GL= oblate (globe), P= pear, PL= plum, S=square

Z 1= very soft, 2= soft, 3= medium, 4= firm, 5= very firm

TABLE 9. SEED SOURCE OF THE TOMATO CULTIVARS EVALUATED IN 1983.

| NUMBER | NAME                             | COUNTRY     |
|--------|----------------------------------|-------------|
| 01     | AV RDC                           | TAIWAN      |
| 02     | TANZI ARMANDO SEMENTI            | ITALY       |
| 03     | DESSERT SEEDS                    | USA         |
| 04     | I P B                            | USA         |
| 05     | CALIFORNIA SEEDS                 | USA         |
| 06     | PETOSEED                         | USA         |
| 07     | TEZIER FRERES                    | FRANCE      |
| 08     | KEYSTONE SEEDS (AGRIGENETICS)    | USA         |
| 09     | RACI SEMENTI                     | ITALY       |
| 10     | PETO ITALIANA                    | ITALY       |
| 11     | CASTLE SEEDS                     | USA         |
| 12     | INST. AGRIC. RESEARCH            | NIGERIA     |
| 13     | HARRIS SEEDS                     | USA         |
| 14     | W. GREENLEAF (AUBURN U N IV)     | USA         |
| 15     | T. HERNANDES (LOUSTANA ST. UNIV) | USA         |
| 16     | CAMPBELL I R T                   | USA         |
| 17     | FERRY MORSE                      | USA         |
| 18     | NIAGARA                          | USA         |
| 19     | ROYAL SLUJS                      | NETHERLANDS |
| 20     | HERBTS BROTHERS                  | USA         |
| 21     | J. AUGUSTINE (B H N RESEARCH)    | USA         |
| 22     | ASGROW SEEDS                     | USA         |
| 23     | USDA VEG LAB.                    | USA         |
| 24     | J. TANAKA (UNIV HAWAII)          | USA         |
| 25     | E. KERR (MINISTRY AGRIC.)        | CANADA      |
| 26     | S. BERRY (OARDC, OHIO ST. U N W) | USA         |