# 2019-2020 FINAL ORANGE CROP FORECAST FOR SÃO PAULO AND WEST-SOUTHWEST MINAS GERAIS CITRUS BELT – APRIL UPDATE

**Current forecast update (variation regarding the February forecast update):** **April 09, 2020**

**Total orange crop production forecast[1]: 386.79 million boxes (increased of 0.50%)**
**Hamlin, Westin and Rubi: 76.27 million boxes (unchanged)**
**Other early season[2]: 19.83 million boxes (unchanged)**
**Pera Rio: 118.29 million boxes (unchanged)**
**Valencia and Valencia Folha Murcha: 125.81 million boxes (increased of 1.45%)**
**Natal: 46.59 million boxes (increased of 0.26%)**

The orange production forecast of the 2020-2021 season will be released at 10:00 a.m. (BRT, GMT -3:00) on May 11, 2020.

**Orange crop forecast update by sector and variety group – citrus belt**

| Month | Forecast components | | | | Crop forecast update 2019-2020 | | | Crop forecast update 2019-2020 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | February/2020 and April/2020 (strike-through values were presented in February, to their left are their respective values updated in December) | | | | February/2020 | | | April/2020 | | |
| Sector and variety group | Bearing trees | Fruit per tree at stripping[3] | Fruit estimated per box | Estimated drop rate | Per tree | Per hectare | Total | Per tree | Per hectare | Total |
| | (1,000 trees) | (number) | (number) | (%) | (boxes/ tree) | (boxes/ hectare) | (1,000,000 boxes) | (boxes/ tree) | (boxes/ hectare) | (1,000,000 boxes) |
| **CITRUS BELT** | | | | | | | | | | |
| Hamlin, Westin and Rubi..... | 25,482 | 1,114 | 300 | 10.50 | 2.99 | 1,319 | 76.27 | 2.99 | 1,319 | 76.27 |
| Other early[2]..... | 8,016 | 834 | 262 | 13.20 | 2.47 | 1,121 | 19.83 | 2.47 | 1,121 | 19.83 |
| Pera Rio..... | 62,869 | 665 | 261 | 17.50 | 1.88 | 943 | 118.29 | 1.88 | 943 | 118.29 |
| Valencia and Folha Murcha[4].. | 58,269 | 735 | 239 ~~244~~ | 21.50 | 2.13 | 984 | 124.01 | 2.16 | 998 | 125.81 |
| Natal..... | 19,337 | 853 | 247 ~~248~~ | 22.00 | 2.40 | 1,079 | 46.47 | 2.41 | 1,082 | 46.59 |
| **Total**..... | **173,973** | **783** | **261** ~~**262.3**~~ | **17.63** | **2.20** | **1,040** | **384.87** | **2.22** | **1,045** | **386.79** |
| **NORTH SECTOR** | | | | | | | | | | |
| Hamlin, Westin and Rubi..... | 6,970 | 1,210 | 300 | 10.50 | 3.25 | 1,403 | 22.66 | 3.25 | 1,403 | 22.66 |
| Other early[2]..... | 2,029 | 808 | 262 | 13.20 | 2.40 | 1,150 | 4.87 | 2.40 | 1,150 | 4.87 |
| Pera Rio..... | 12,987 | 600 | 261 | 17.50 | 1.70 | 911 | 22.06 | 1.70 | 911 | 22.06 |
| Valencia and Folha Murcha[4].. | 14,391 | 757 | 239 ~~244~~ | 21.50 | 2.19 | 994 | 31.56 | 2.22 | 1,009 | 32.02 |
| Natal..... | 3,920 | 911 | 247 ~~248~~ | 22.00 | 2.57 | 1,081 | 10.06 | 2.57 | 1,084 | 10.09 |
| **Subtotal**..... | **40,297** | **802** | **261** ~~**262.3**~~ | **17.63** | **2.26** | **1,065** | **91.21** | **2.28** | **1,070** | **91.70** |
| **NORTHWEST SECTOR** | | | | | | | | | | |
| Hamlin, Westin and Rubi..... | 2,565 | 1,031 | 300 | 10.50 | 2.77 | 1,223 | 7.10 | 2.77 | 1,223 | 7.10 |
| Other early[2]..... | 1,407 | 618 | 262 | 13.20 | 1.83 | 842 | 2.58 | 1.83 | 842 | 2.58 |
| Pera Rio..... | 8,278 | 655 | 261 | 17.50 | 1.86 | 827 | 15.36 | 1.86 | 827 | 15.36 |
| Valencia and Folha Murcha[4].. | 3,600 | 679 | 239 ~~244~~ | 21.50 | 1.96 | 947 | 7.08 | 1.99 | 960 | 7.18 |
| Natal..... | 1,781 | 711 | 247 ~~248~~ | 22.00 | 2.00 | 930 | 3.57 | 2.01 | 933 | 3.58 |
| **Subtotal**..... | **17,630** | **717** | **261** ~~**262.3**~~ | **17.63** | **2.02** | **921** | **35.69** | **2.03** | **924** | **35.80** |
| **CENTRAL SECTOR** | | | | | | | | | | |
| Hamlin, Westin and Rubi..... | 6,390 | 989 | 300 | 10.50 | 2.66 | 1,146 | 16.98 | 2.66 | 1,146 | 16.98 |
| Other early[2]..... | 2,966 | 922 | 262 | 13.20 | 2.73 | 1,187 | 8.11 | 2.73 | 1,187 | 8.11 |
| Pera Rio..... | 18,074 | 671 | 261 | 17.50 | 1.90 | 959 | 34.36 | 1.90 | 959 | 34.36 |
| Valencia and Folha Murcha[4].. | 15,835 | 746 | 239 ~~244~~ | 21.50 | 2.16 | 991 | 34.20 | 2.19 | 1,005 | 34.70 |
| Natal..... | 4,497 | 921 | 247 ~~248~~ | 22.00 | 2.59 | 1,099 | 11.67 | 2.60 | 1,102 | 11.70 |
| **Subtotal**..... | **47,762** | **778** | **261** ~~**262.3**~~ | **17.63** | **2.20** | **1,026** | **105.32** | **2.22** | **1,032** | **105.85** |
| **SOUTH SECTOR** | | | | | | | | | | |
| Hamlin, Westin and Rubi..... | 4,334 | 820 | 300 | 10.50 | 2.20 | 952 | 9.55 | 2.20 | 952 | 9.55 |
| Other early[2]..... | 450 | 792 | 262 | 13.20 | 2.35 | 854 | 1.06 | 2.35 | 854 | 1.06 |
| Pera Rio..... | 13,177 | 681 | 261 | 17.50 | 1.93 | 942 | 25.41 | 1.93 | 942 | 25.41 |
| Valencia and Folha Murcha[4].. | 11,846 | 719 | 239 ~~244~~ | 21.50 | 2.08 | 889 | 24.66 | 2.11 | 901 | 25.01 |
| Natal..... | 3,193 | 836 | 247 ~~248~~ | 22.00 | 2.36 | 1,028 | 7.52 | 2.36 | 1,031 | 7.54 |
| **Subtotal**..... | **33,000** | **729** | **261** ~~**262.3**~~ | **17.63** | **2.06** | **931** | **68.20** | **2.08** | **936** | **68.57** |
| **SOUTHWEST SECTOR** | | | | | | | | | | |
| Hamlin, Westin and Rubi..... | 5,223 | 1,424 | 300 | 10.50 | 3.83 | 1,815 | 19.98 | 3.83 | 1,815 | 19.98 |
| Other early[2]..... | 1,164 | 931 | 262 | 13.20 | 2.76 | 1,384 | 3.21 | 2.76 | 1,384 | 3.21 |
| Pera Rio..... | 10,353 | 720 | 261 | 17.50 | 2.04 | 1,063 | 21.10 | 2.04 | 1,063 | 21.10 |
| Valencia and Folha Murcha[4].. | 12,596 | 727 | 239 ~~244~~ | 21.50 | 2.10 | 1,081 | 26.52 | 2.14 | 1,097 | 26.91 |
| Natal..... | 5,947 | 814 | 247 ~~248~~ | 22.00 | 2.29 | 1,137 | 13.64 | 2.30 | 1,139 | 13.67 |
| **Subtotal**..... | **35,284** | **850** | **261** ~~**262.3**~~ | **17.63** | **2.39** | **1,211** | **84.45** | **2.41** | **1,217** | **84.87** |

[1] Hamlin, Westin, Rubi, Valencia Americana, Seleta, Pineapple, Pera Rio, Valencia, Valencia Folha Murcha and Natal.
[2] Valencia Americana, Seleta and Pineapple.
[3] Weighted average per stratum bearing trees.
[4] Folha Murcha – Valencia Folha Murcha.

**Orange production for the 2019-2020 crop season totals 386.79 million boxes[1]**

The final 2019-2020 orange crop forecast for São Paulo, Triângulo Mineiro and West-Southwest Minas Gerais citrus belt, published on April 09, 2020 by Fundecitrus – performed in cooperation with Markestrat, FEA-RP/USP and FCAV/Unesp[2] – is 386.79 million boxes of 40.8 kg each, which represents a decrease of 0.54% in relation to the first crop forecast carried out in May 2019 of 388.89 million boxes. This crop is 35.3% larger in comparison to the previous season (2018-2019), when 285.98 million boxes were produced, evidencing the biennial production cycle of orange trees, that is, larger crops alternated with smaller ones.

Total orange production for this crop included:

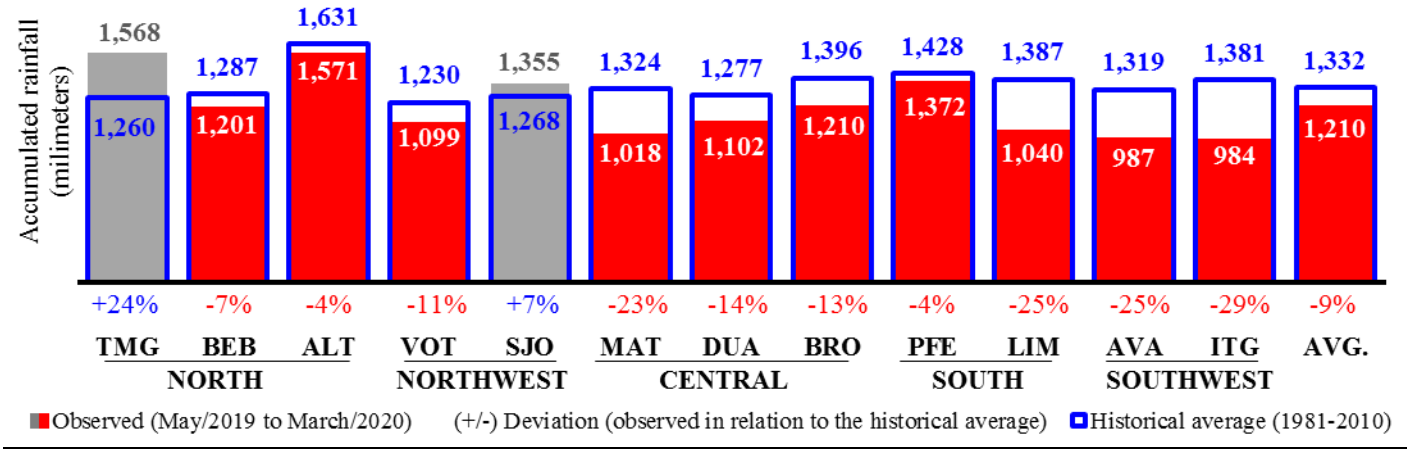
- 76.27 million boxes of the Hamlin, Westin and Rubi varieties;
- 19.83 million boxes of the Valencia Americana, Seleta and Pineapple varieties;
- 118.29 million boxes of the Pera Rio variety;
- 125,81 million boxes of the Valencia and Valencia Folha Murcha varieties;
- 46.59 million boxes of the Natal variety.

Approximately 26.98 million boxes were produced in the Triângulo Mineiro.

The observed productivity was 1,045 boxes per hectare, a decrease of six boxes per hectare in relation to the original projection, although still a record. Such historical milestone was possible through a convergence of factors. On one side, in the last decades growers employed higher technology on replanting groves and adopted proper cultural practices, and on the other side, nature contributed with favorable climate that enabled plants to reach full production potential in terms of fruit per tree.

Ideal climatic conditions during winter and spring of 2018 favored abundant flowering and good setting of flowers and fruitlets, resulting not only in a high number of fruits per tree but also in a more homogeneous production, with close to 94% of fruits from first and second blooms. At fruit filling and harvest, that is, from May 2019 to March 2020, accumulated rainfall amounted to 1,210 millimeters, which is 9% or 121 millimeters below the historical average of 1,332 millimeters (1981-2010), according to data from Somar Meteorologia. Early crop season was the driest period, from May to August 2019. Rains resumed in the first week of September 2019, before a two-week Indian Summer hit most of the citrus belt. Only in mid-October 2019 the rainy season intensified, although the accumulated monthly rainfall was still below average. Rainfall was significant and well distributed throughout November 2019. In December 2019 and January 2020, rainfall increased to high volumes of 192 and 233 millimeters, respectively, however still below normal. The following month of February was the rainiest of the crop season, totaling 281 millimeters, although in March, with an accumulated rainfall of 93 millimeters, rainfall was again below average.

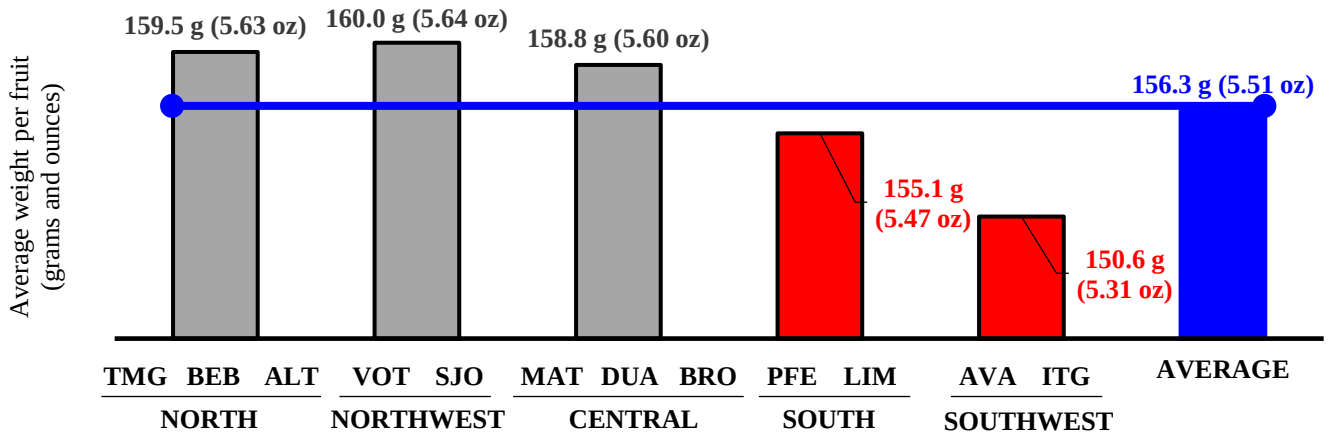
As mentioned in the February 2020 crop forecast update, the shortage of rains was more pronounced in the Central, South and Southwest sectors. The largest negative deviation was observed in the region of Itapetininga, where the accumulated rainfall was 984 millimeters, corresponding to 29% or 397 millimeters below normal. In the North and Northwest sectors, rainfall reached larger volumes, mainly in the regions of Triângulo Mineiro (1,568 millimeters) and São José do Rio Preto (1,355 millimeters). Except for those two locations, all other regions of the citrus belt had accumulated rainfall below historical average, as shown in Graph 1.




Graph 1: Accumulated rainfall from May 2019 to March 2020 in citrus belt regions.
Source: Fundecitrus, from data supplied by Somar Meteorologia.

In general, the rainfall volume reduction in relation to the historical average affected the growth of oranges that in average weighed even less than the projection of May 2019. At that time, signs already pointed to fruit being small, such as the large number of fruits per tree; the high rate of oranges from first and second blooms in relation to total oranges; and below average fruit weight measured at stripping, as compared to previous crop seasons. Data collected during the crop season shows that the average weight of harvested fruits was 156.3 grams (5.51 oz), whereas the initial projection was for that weight to reach 157 grams at harvest (5.54 oz). In view of that weight, 261 fruits were necessary to fill a box of 40.8 kg, which is 0.38% lower than the initial projection of 260 fruits per box.

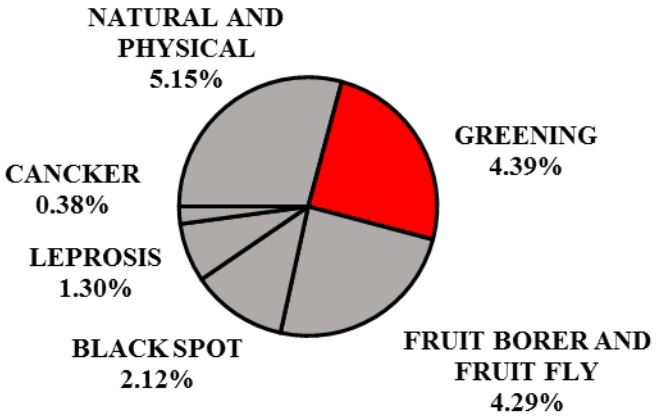
The average fruit weight varied significantly for different sectors of the citrus belt. One of the main reasons for that is related to rainfall volumes. As presented in the last crop forecast update, oranges harvested in the South and Southwest sectors did not reach the average weight for the citrus belt, of 156.3 grams (5.51 oz). Graph 2 shows that fruits were harvested with a weight of approximately 155.1 grams (5.47 oz) in the South sector and were even smaller in the Southwest sector, with a weight of 150.6 grams (5.31 oz). The regions of Avaré, Itapetininga and Limeira are located in those sectors, where negative rainfall deviations varied from 25% to 29% in relation to normal, recording the worst rainfall rates observed in those regions in the last five crop seasons.




Graph 2: Average weight of fruits per sector.
Source: Fundecitrus.

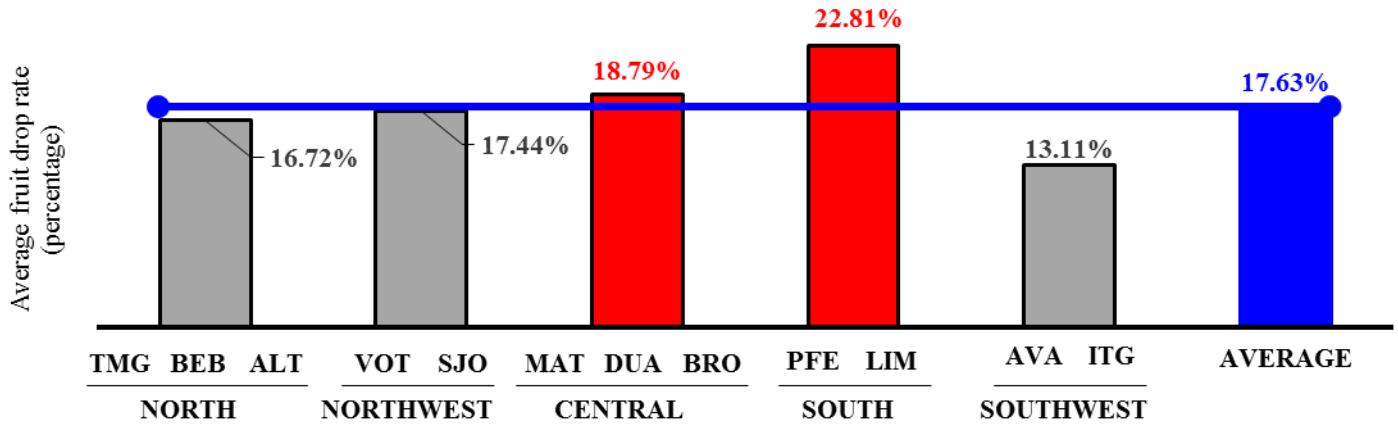
In the analysis by variety, a projected average weight of 296 fruits per box (137.8 grams or 4.86 oz per fruit) in May 2019 for the group that includes Hamlin, Westin and Rubi was updated at the end of the crop season to 300 fruits per box (136.0 grams or 4.80 oz per fruit). The projected average weight of 270 fruits per box (151.1 grams or 5.33 oz per fruit) for oranges of other early varieties in May 2019 was updated to 262 fruits per box (155.7 grams or 5.49 oz per fruit). The initial projection of 266 fruits per box (153.4 grams or 5.41 oz per fruit) for Pera Rio was updated to 261 fruits per box (156.3 grams or 5.51 oz per fruit). The average fruit size projection for Valencia and Valencia Folha Murcha in May 2019 of 235 fruits per box (173.6 grams or 6.12 oz per fruit) was updated to 239 fruits per box (170.7 grams or 6.02 oz per fruit) at the end of the crop season. The initial projection for Natal of 242 fruits per box (168.6 grams or 5.95 oz per fruit) was updated to 247 fruits per box (165.2 grams or 5.83 oz per fruit) at this final crop forecast.

The average fruit drop rate for the citrus belt, accumulated since the beginning of the crop season, was 17.63%, which is within the margin of error of plus or minus 0.77 percentage point, with 95% confidence. Field survey data confirmed the expectation that the fruit drop rate in this crop season would be the highest ever measured by Fundecitrus. The increased greening intensity and the population growth of fruit borer and fruit fly were the main reasons for a higher projected fruit drop rate as compared to that of previous years, which was also confirmed by the survey of fruit drop causes. As presented in Graph 3, field data showed that the fruit drop rate comprised the following causes: 5.15% physiological drop, mechanized activities or adverse climatic conditions; 4.39% greening; 4.29% fruit borer and fruit fly; 2.12% black spot; 1.30% leprosis and 0.38% citrus canker.



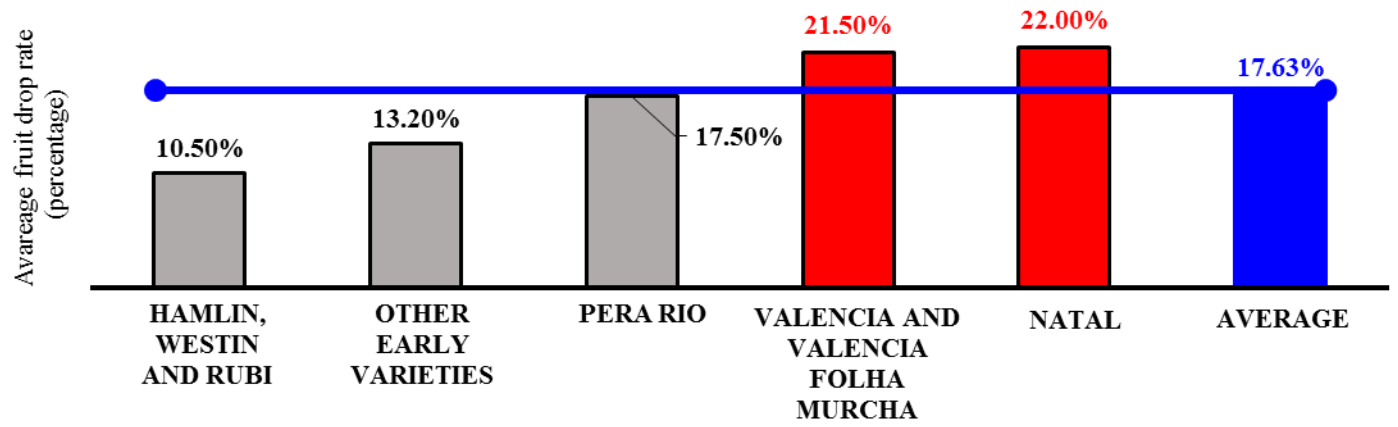

Graph 3: Causes comprising the average fruit drop rate, with emphasis on greening (disease that caused the most fruit drop).
Source: Fundecitrus.

As presented in the previous crop forecast update, average fruit drop rates were calculated for comparison among the five sectors. The South sector, including the regions of Porto Ferreira and Limeira, presented the worst rate of 22.81%, as shown in Graph 4. Other sector with a fruit drop rate above general average was the Central one (18.79%), including the regions of Matão, Duartina and Brotas. The most probable causes for these sectors to present the largest fruit drop rates are the high incidence of orange trees with symptoms of greening and the considerable number of trees with high disease severity. The survey of diseases carried out by Fundecitrus in 2019 showed that the percentage of contaminated trees was 36.96% in the South sector; 30.76% in the Central sector, and significantly lower in the other sectors.




Graph 4: Average fruit drop rate per sector.
Source: Fundecitrus.

The drop rate distribution for varieties showed the lowest rate of 10.50% and margin of error of ± 1.28 percentage point for Hamlin, Westin and Rubi; a rate of 13.20% and margin of error of ± 1.77 percentage point for other early varieties; 17.50% and margin of error of ± 1.49 percentage point for Pera Rio. As shown in Graph 5, a drop rate of 21.50% and margin of error of ± 1.52 percentage point was above average for Valencia and Valencia Folha Murcha, likewise the drop rate of 22.00% and margin of error of ± 1.99 percentage point for Natal.




Graph 5: Average fruit drop rate per variety.
Source: Fundecitrus.

Data from the field survey used in crop forecast updates are obtained by a stratified sampling per region, variety and age. Specifics on average fruit weight and average fruit drop rate per sector serve only for comparison among different locations. The survey starts in May on 1,200 plots that are visited and sampled on a monthly basis until harvest is complete. Other information included in this study is size of fruit received throughout the crop season by orange juice companies associated to Fundecitrus – Citrosuco, Cutrale and Louis Dreyfus – for industrial processing. Each processing company supplies individual data under confidentiality to the independent consulting firm for the calculation of the average size of processed fruit.

[1] Hamlin, Westin, Rubi, Valencia Americana, Seleta, Pineapple, Pera Rio, Valencia, Valencia Folha Murcha and Natal.
[2] Departament of Math and Science at FCAV/Unesp Campus Jaboticabal.