

Measurement of Fruit Firmness

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I. Materials

- A. Effegi penetrometer or Magness-Taylor pressure tester, either hand-held or mounted on a stand for consistency.

II. Procedure

- A. Make sure all fruits tested are comparable in temperature since warm fruits are usually softer than cold fruits.
- B. Make 2 puncture tests per fruit, once on each of the opposite cheeks, midway between the stem-end and calyx-end.
- C. Remove a disc (about 2 cm in diameter) of the skin with a stainless steel vegetable peeler or sharp knife.
- D. Use an appropriate tip (plunger) size for each commodity (5/16" for stone fruit and kiwifruit, D'Anjou pears, Bosc pears, Comice pears, Bartlett pears, and Winter Nellis pears; 7/16" for most apples).
- E. All determinations for a given lot should be made by one person to minimize variability.
- F. Hold the fruit against a stationary hard surface and force the tip into the fruit at a uniform speed (take 2 seconds).
- G. Depth of penetration should be consistent to the inscribed line on the tip.
- A. Record reading to the nearest 0.5 lb or 0.25 kg.
 - 1. The unit should be written as poundforce (lbf) or kilogram (kgf) in order to avoid confusion with the units of mass.

I. Maintenance

- A. Before use on a given day, work the plunger in and out about 10 times to loosen up the springs inside the instrument.
- B. Clean the tips after use to prevent clogging with fruit juice.

II. Calibration:

A. Hold the firmness tester in a vertical position and place the tip onto the pan of an accurate scale.

1. Press down slowly on the firmness tester until the scale registers a given weight, then read the firmness tester. Repeat this comparison 3 to 5 times. If you find that the instrument is properly calibrated, it is ready to use.

B. If the instrument reading is not in agreement with the scale reading, find out the magnitude and direction of the difference and proceed as follows:

1. Effegi fruit penetrometer:

- a) Unscrew the chrome guide nut to remove the plunger assembly.
- b) To make the instrument read lower, insert washers between the spring and the stationary brass guide.
- c) To make the instrument read higher, insert washers between the chrome guide nut and the stationary brass guide on the plunger shaft.
- d) Reassemble and recheck for calibration.

2. Magness-Taylor Pressure Tester:

- a) Remove the plunger assembly from the barrel of the instrument and remove the bolt and washers from the end of the plunger assembly.
- b) Pull the plunger and spring out of the metal cylinder, then shake the washers out of the cylinder.
- c) To make the instrument read lower, move washers from inside to outside the metal cylinder.
- d) To make the instrument read higher, move washers from outside to inside the metal cylinder.
- e) Reassemble and recheck for calibration.

C. If the indicator needle does not stop or does not release properly, clean the case in the area of the release button, remove the plunger assembly, and then lubricate the inside of the instrument with an aerosol lubricant.