Sample Homogenization of Fruit Crop Samples: Field and Laboratory Considerations For Attaining Quality Residue Data

Thomas Moate, M.S.

Golden Pacific Laboratories

Fresno, California
Crop Sample Homogenization

• Why is homogenization important?
• What are some challenges in obtaining good homogenization?
• What are some of the challenges maintaining sample integrity?
• How can we maintain sample integrity while reducing cost?
Common Terms, Commonly Used *Incorrectly*

- **Homogenous** [huh-moj-uh-nuh s]
  1. Biology. corresponding in structure because of a common origin.

  vs.

- **Homogeneous** [hoh-muh-jee-nee-uh s]
  1. composed of parts or elements that are all of the same kind
  2. of the same kind or nature; essentially alike

*Dictionary.com*
Equipment
How much homogenization?

Smaller particle size allows for reduced homogeneous sample size, 20 g to 2 g
Whole pear sample Ground to a fine powder with dry ice
What preparation is needed?

• Strawberries – common to remove caps
• Grape bunches – removal from stems?
• Pome fruits – removal of stems
• Samples prepared for consumption?
• Root crops – removal of excess soil?
• Custom tools – pineapple coring tool, cherry pit remover
• Unexpected observations
De-stemming grapes
Special Instructions

• Crop samples can be reanalyzed, but we only get one chance to homogenize the sample correctly.

• Example protocol text from a radish study:

If excessive soil or debris adheres to the root, remove it by gently brushing it off. Document how samples were cleaned [on the appropriate form]. If necessary, lightly rinse off with a minimal amount of clean water and patting dry (with cloth or paper towel). Do not rub while rinsing or drying the roots. -AAFC
Pre-cutting pears & removing stems
Coring Fresh Pineapple
Uninvited Guests
• Example protocol text from a leafy vegetable study: Samples Prepared for Consumption

Celery: Using a clean, dry knife, remove the inedible portion of the stalk (i.e., the woody part at the base of the stalk) to allow the stems to separate. Do not remove the leaves unless discolored or damaged. Wash the stems under cold running water for approximately 15-20 seconds to assure that all surfaces have been rinsed and that all extraneous matter (e.g., soil) is removed. Allow to drain for at least 2 minutes on paper towels on a flat surface. -TCl
Sample receiving at the lab
Sample Integrity

• Shipments: *questions* that arise that the lab...
  – Was notice provided to the lab of the shipment?
    • Protocol, e.g. following shipment notify the SD and PAI
    • If you forget to do this it is a *protocol deviation*
    • Email is best, phone call is OK also (write call report)
  – Does the Sample ID (label) match the protocol?
  – Does the CoC match the sample label?
  – Does the waybill # match the CoC and the boxes?
Overnight Shipments

• Common Carriers
e.g. FedEx
  – tracking number provided?
  – delivery exception?
  – shipment made early in the week?
  – Is there enough dry ice to last 1 extra day?
It’s Not Easy Being a Sample Label...

Secondary Labeling is Good!

Goodbye cruel world!
Secondary Labeling Can Help Avoid the Shell Game

Chemists don’t like the shell game.
Labels

When it comes to labeling samples, here is your best friend...

Tape makes for happy labels

Happy labels make happy scientists!
Sample size

• OPPTS 860.1500 12 units for large items & 24 units for small items
  – 6 fruit from each of four trees
  – 12 heads of lettuce

• Or sample weight from number of areas
  – 1 kg leaf lettuce from 12 areas within the plot
Big Samples, REALLY BIG samples
Subsampling

Preferably considered and described in protocol

- e.g. cantaloupe, “larger fruit may be halved or quartered by cutting longitudinally to reduce sample weight”

- Specific instructions

- Preferably done in the field to reduce costs; shipping, handling & homogenization
Subsampling

- OPPTS 860.1500 requirements
  - Maintaining representative subsample
  - Avoiding contamination
  - Avoiding deterioration
  - Clean area available
  - Personnel instructed and trained
It is a pleasure to serve you!

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