

## FINAL PROJECT REPORT

**Project Title:** ARS Dry Bin Filler

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**Cooperators:** Mike Robinson, Double Diamond Fruit,  
Scott Wolford, USDA-ARS,  
Michael Glenn, USDA - ARS

### Budget History: WTFRC

| Item         | 2008 |
|--------------|------|
| Crew labor   | 700  |
| Shipping     | 3175 |
| Travel       | 250  |
| <b>Total</b> | 4125 |

**Footnotes:** shipping one way (West VA to WA)

### Budget History: WSU

| Item         | 2008 |
|--------------|------|
| Supplies     | 200  |
| Travel       | 242  |
|              | 2658 |
| <b>Total</b> | 3100 |

**Footnotes:** 2658.52 - travel expenses for ARS Technician  
(airfare, ground transport, lodging and per diem – 6 days)

## **Objectives:**

1. Evaluate the commercialization of the dry bin filler and the engineering in a commercial setting.
2. Facilitate opportunities for regional engineers (public and private), warehouse/packing house owners and operators, and private sector manufacturing firms to watch the unit run and offer informal evaluation of engineering
3. Evaluate the unit and engineering for use in the orchard.

## **Significant Findings:**

### **Objective 1.**

The ARS Bin Filler was joined to the packing line at Double Diamond Fruit Monday May 19. Fuji and Golden Delicious were run 8 hours a day for four days. Data was taken on 16-18 # Fuji's and 10-12 # Golden Delicious. Data analysis, Impact Sphere results and observations indicate that the bin filler performed above current industry standards in terms of percent bruising and fruit downgrades. This prototype is mechanically sound. Improvements must be made to sponge roll elevator between line and filler. Improvements need to be made to reduce bar dents. Adjustments must be made to reduce drop of bottom layer of fruit. Should design / build to be bin size reconfigurable. Simple engineering. Fill rate was 8 bins/ hour.

Objective 2. Several individuals representing fruit packing sector and equipment development sector observed the equipment running on a commercial line.

Objective 3. ARS received requests from Van Doran and Blueline Manufacturing to conduct in house evaluations of the bin filler. Blueline Manufacturing evaluated the bin filler for orchard use; Van Doran evaluated the bin filler for both packing lines and orchard use.

## **Results and Discussion:**

The ARS Bin Filler was joined to the packing line at Double Diamond Fruit Monday May 19. Fuji and Golden Delicious were run 8 hours a day for four days. Mechanically, the equipment ran continuously, without any interruptions due to equipment failure. Minor adjustments were made throughout the 4 day period.

The first data set indicated unacceptable bruising levels in the first layer of fruit that was placed into an empty bin. This bruising was mitigated by putting bubble liners on the bottom of each bin. This is not a preferred practice but did take the level of bruising from unacceptable to acceptable.

Because the equipment was performing well both mechanically and in terms of fruit handling, Double Diamond Fruit purchased the services of Van Doran Sales to conduct an Impact Ball evaluation.

Fruit data analysis for bruising:

Fuji – 96 % of fruit was in acceptable range. No anticipated downgrades as a result of bruising  
Golden – 94 % of fruit was in acceptable range. No anticipated downgrades as a result of bruising

Impact Ball: (Golden Delicious Only)

Impact ball is a stand alone impact recording device designed to record impacts using the “G” force for its measuring scale. Average G’s across the tests were all below the threshold. However, there were several tests that resulted in G’s very close to the threshold and well above. The testing methodology allowed for the identification and locations on the bin filler where improvements must be made prior to acceptance in the commercial sector.



USDA – ARS Drv Bin Filler

## **EXECUTIVE SUMMARY**

**WTFRC Project Number:** AP-08-811

**Project Title:** ARS Dry Bin Filler

In March 2008, WTFRC commissioners participated in a demonstration of the USDA dry bin filler at the USDA – ARS lab in Kerneysville, W. VA. Commissioners decided that the bin filler might meet the requirements for a dry bin filler for use in the orchard at harvest and on commercial packing lines.

Objectives were identified and funding was secured to fund the transportation of the bin filler to Washington State and to support the travel and per diem of USDA- ARS technician, Scott Wolford. Objectives were as follows: 1. evaluate the commercialization of the dry bin filler in a commercial setting, 2. facilitate opportunities for regional engineers (public and private), warehouse/packing house owners and operators, and private sector manufacturing firms to watch the unit run and offer informal evaluation of engineering and, 3. evaluate the unit and engineering for use in the orchard.

The unit was joined to the packing line at Double Diamond Fruit, Quincy, WA on May 19, 2008. Fuji and Golden Delicious were run 8 hours a day for four days. Mechanically, the equipment ran continuously, without any interruptions due to equipment failure. Minor adjustments were made throughout the 4 day period. Across the 4 days, the bin fill rate was 8 bins/ hour.

To evaluate percent bruising and location on the unit where bruising occurred, we ran a pre/post fruit evaluation and employed Van Doran Sales to conduct an Impact Ball Evaluation.

Data analysis, Impact Sphere results and observations indicate that the bin filler performed above current industry standards in terms of percent bruising and fruit downgrades. Fruit data analysis for bruising:

Fuji – 96 % of fruit was in acceptable range. No anticipated downgrades as a result of bruising  
Golden – 94 % of fruit was in acceptable range. No anticipated downgrades as a result of bruising

Impact Ball: (Golden Delicious Only)

Average G's across the tests were all below the threshold. However, there were several tests that resulted in G's very close to the threshold and well above.

This prototype is mechanically sound. Improvements must be made to sponge roll elevator between line and filler. Improvements need to be made to reduce bar dents. Adjustments must be made to reduce drop of bottom layer of fruit. Should design / build to be bin size reconfigurable.

BlueLine Manufacturing and Van Doran Sales evaluated the unit. Both reported that it would not meet their needs. Results have been shared with USDA-ARS.

Bin Filler was delivered to U of I – Parma Research Station on Sunday November 23. The delivery to Parma was at the direction of Dr. Michael Glenn, USDA-ARS. At delivery, the WTCFC and WSU have no further obligations or responsibilities in terms of equipment security, testing or transportation.