

# Apple Fruit Russet Assessment for High Value Varieties, Year 1

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## INTRODUCTION

The term russet on apples refers to areas of the skin that are light brown in color and rough to the touch. Russetting may be limited to small areas of the fruit or may cover nearly the entire fruit. Often russet is most severe around the stem basin, but occasionally the entire fruit surface may be covered making the fruit not salable for the fresh market. Some apple cultivars are prone to skin russetting and losses in pack outs are in the range of 1 to 5%, depending on the susceptibility. Golden Delicious are well known as a russet prone variety as is the new variety Minnieska. The major, high value, varieties, Honeycrisp and Gala are also prone to russet.

## INTENT

There are many skin surface problems that could lead to russet – frost, chemicals, and fungal pathogens – all of which could injure the cells in the waxy cuticle. Early in the growing season the cuticle cells are most susceptible to injury and as these injured cells expand, very small cracks may develop in the fruit skin. Cells under the cracks die and cork cells form resulting in russet. Many environmental and chemical conditions during the first 60 days after bloom can exacerbate russet. Cuticle cell injury that causes russet occurs early in the growing season, but is not easily visible to the naked eye. Environmental conditions during the early growing season play a huge role in the development of russet. Chemical use in apples could be the causal agent of russet, either alone as injury or in concert with environmental conditions such as high humidity or extended wetting events.

Our goal was to carefully track several orchards with different spray regimes and different weather patterns for potential fruit skin disorders. Five sites were tracked in the general Grand Rapids area. With MAC, MSHS and MSU GREEN funds, I was able to purchase a dissecting microscope with a camera set up to capture images of fruit skin with very clear resolution.



## SITE INFORMATION COLLECTED:

- Variety/strain, Rootstock, Tree age, Weather data
- Russet was rated on a scale of 1 to 5 (see inset).

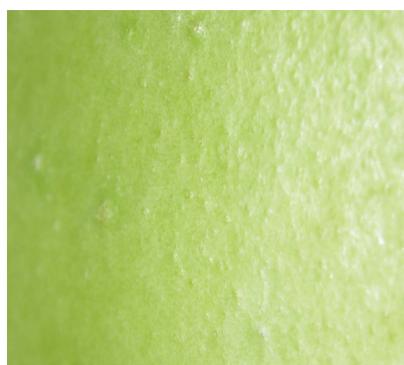
### Russet graded from 1 to 5

- |   |   |
|---|---|
| 1 | - no to very little russet                      |
| 2 | - russet in stem bowl only                      |
| 3 | - russet over the sides of stem bowl            |
| 4 | - russet on sides, but less than 30% of surface |
| 5 | - russet on sides, more than 30% of surface     |

## ACTIVITIES, ACCOMPLISHMENTS, IMPACTS:

To monitor russet development weekly on important highly susceptible varieties.

- Beginning in the pink stage (late April 2017), 5 Gala orchard sites were monitored weekly for russet development on fruitlets.
- All seemed to be going along well until the cold snaps on May 8 and 9, 2017. In Table 1, dates and ratings for russet are given for the April to June timeframe. I continued to monitor fruit through the summer, but less frequently once it was clear, russet from freezing temperatures was the dominant damage to fruit skin.
- From the May 8, 2017 freeze event, many fruits had some form of skin damage due to frost which made it very difficult to further understand any effects of sprays or weather from then on. In summary, if fruitlets were clean after the freeze events, they stayed clean the rest of the season.



Clean skin June 2017 (80X)



Damaged lenticels June 2017 (80X)



Frost damaged skin Sept 2017 (10X)



Ribbon Scald on Honeycrisp was quite prevalent in 2017

Weather data from MSU's EnviroWeather monitoring stations will be collected to later be correlated with the onset of russet.

The plan was to monitor various measurements of weather and match data with any spray applications to observe possible damage to fruit skin (see Table 2). Again, the freezing weather on May 8 and 9, 2017 led to several sites with some form of russet or damage to lenticels.

No commonalities in spray records were found to be a source of additional russet across all orchard blocks.

Table 1. 2017 Apple russet monitoring dates, April – June.

Date	Mac Growth Stage	Sites					Notes
		A	B	C	D	E	
19-Apr	TC	1	1	1	1	1	
26-Apr	KB	1	1	1	1	1	
3-May	FB	1	1	1	1	1	
10-May	PF	1	1	1	1	1	fruit damage from freeze noted
17-May	6 mm	1	1.2	1	1	1.1	small frost marks noted
24-May	10 mm	1.1	1	1.1	1.1	1	frost marks noted
31-May	12 mm	1.2	1.9	2.1	1.7	1.2	frost marks noted
7-Jun	17 mm	2.3	3.2	2.1	2.5	2	
14-Jun	22 mm	2.4	3.1	2.7	2.6	1.9	
21-Jun	25 mm	2.7	2.9	2.7	2.5	1.8	June drop

## SUMMARY AND FUTURE WORK:

- The term russet on apples refers to areas of the skin that are light brown in color and rough to the touch. It's a simple definition with many, many causes – all of which are somehow related to the environment and specifically temperature, sunlight, and relative humidity.
- With this first year of study, the effects of freezing temperatures in the early fruit development stages led to various types of russet symptoms for the 2017 apple crop. Then late summer heat and dryness led to other damage to lenticels and rots moved in expectantly. Odd fall weather also led to an increase in ribbon scald in Honeycrisp (see picture below). This project will be submitted for a second year of funding through various supporting industry groups.

## SPONSORS INCLUDE:

- We are grateful to many people and organizations who have made this project possible either through direct funding or indirectly through cooperation....
- Michigan Apple Committee
- Michigan State Horticulture Society
- MSU Project GREEN
- Michigan Tree Fruit Commission
- The apple growers letting us take fruit from their farms each week
- Michigan State University Extension
- For more information, please contact Amy Irish-Brown – irisha@msu.edu