

Pollination of W. Murcott Afourer Mandarins¹

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Introduction

W. Murcott Afourer mandarin has been one of the most planted mandarins in California. It appears to have good fruit quality, does not granulate, is easy to peel, and has good yields. Most importantly, for the consumer, it can be seedless. Seedlessness in mandarins requires that the fruit not be cross-pollinated. One of the primary ways to ensure that there will be no cross-pollination is by planting this variety in isolated areas, away from other citrus varieties. When there is an abundance of possible locations, such as in California, this is not difficult. However, in Arizona, where land is scarce, it is not always easy to isolate one citrus from others.

Citrus is pollinated by bees and by the wind, and since it is impossible to control the wind, citrus growers can only attempt to thwart the pollination by bees in order to achieve seedlessness. But how far must the W. Murcott be from other citrus varieties? Some research states that bees typically fly from 1.2 to 2.4 miles while foraging for food. But other research suggests much farther. Research by Thomas Chao, in Kern County, shows that a W. Murcott may be cross-pollinated by other varieties that are 1.1 miles away.

Another way to reduce the incidence of bee cross-pollination is to situate the susceptible variety away from other varieties with functional pollen. Dr. Graham Barry has developed a table that rates citrus varieties by their degree of functional pollen. An abbreviated version of this table is as follows:

Cultivar	Pollination Potential
Navel Orange, Star Ruby Grapefruit	Functionally pollen sterile
Midnight Valencia	Very low pollen viability
Marsh Grapefruit Rio Red Grapefruit	Low pollen viability
Red Blush Grapefruit, Oroblanco, Olinda Valencia, Lisbon Lemon	Moderately low pollen viability
Fairchild Mandarin	Moderately high pollen viability
Minneola Tangelo, Clementine	Very high pollen viability

This table can be very useful to estimate relative seediness, however it does not account for the effect of the bees, nor does it specifically address the potential seediness of the W. Murcott. The amount of pollen that the bees deliver to the receptive flower, and the attractiveness of that flower would certainly affect the degree of seediness of the mandarin fruit. In many pollination studies, researchers cover the stigma with pollen, which may or may not simulate the effect of actual bee pollination. However, in avocado, just 2 to 7 grains were found on stigmas that were pollinated.

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Therefore, our objectives in this study are to simulate the effect of bee pollination and apply more controlled levels of pollen to flowers of W Murcott Afourer mandarins in order to determine the seediness and other characteristics of the resulting fruit.

Materials and Methods

This experiment was established at the Yuma Mesa Valley Center, Citrus Variety Block in March 2006. Originally, we had attempted to use bees and bee cages to complete this experiment, but since we were interested in applying a controlled level of pollen, we realized we could not keep the bees from pollinating the same flower over and over, thus losing our control of the amount of pollen put on the stigma.

Flowers were pollinated with 'W. Murcott Afourer' mandarin (selfed), 'Minneola' tangelo, 'Lisbon' lemon and 'Oroblanco' grapefruit hybrid pollen. Each of the four pollen types was considered a treatment. Also, we pollinated with three densities; less than 10 pollen grains per stigma, 10 to 50 grains per stigma, and more than 50 grains per stigma, and each of these densities was considered a treatment. Therefore there were 12 treatments, comprising all combinations of pollen source and grain density. For each of the 12 treatments, we pollinated 50 flowers (600 fruit in all), and removed the anthers so that no additional self-pollination could occur. Then we flagged the branches for identification and bagged them to secure any fruit that might develop.

Fruit was harvested in October, 2006. All the harvested fruit from each plot was passed through an automated electronic eye sorter (Autoline, Inc., Reedley, CA), which provides weight, color, exterior quality and size data for each fruit. In this case, we collected fruit weight, color and shape data. Then we cut open the fruit, and counted the seeds.

All data was analyzed using SPSS 11.0 for Windows (SPSS Inc., Chicago, Illinois).

Results and Discussion

Unfortunately, only 21 fruit developed in the entire experiment. There was no fruit formed as a result of pollination with 'Oro Blanco', therefore it might be assumed that 'Oro Blanco' pollen is not viable enough to cause fruit development. For 'Minneola', 'Lisbon' and 'W. Murcott', 9, 6 and 6 fruit were formed, respectively. Average weight of the fruit ranged from 75 to 100 grams and fruit color and shape were not affected by pollinator or by density of the grains applied to the stigma. . Fruit from all pollinators and densities had between 9 and 12 seeds each. There are very few conclusions that can be drawn, other than that none of these pollinators, with the possible exception of 'Oro Blanco', can be safely planted around 'W. Murcott' with the expectation of avoiding cross pollination. In any event, 'W. Murcott' seems perfectly capable of selfing resulting in a seedy fruit. Furthermore, bees with the slightest level of pollen might be able to successfully pollinate a 'W. Murcott' flower. It would be better for growers to plant the 'Tango' mandarin, an irradiated seedless selection of 'W. Murcott Afourer', which has very low pollen viability. This variety will soon be available from the University of California.