



Nonpareil almond trees: normal, above; severe BF, below



## Almond yield reduction

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**N**ON-INFECTIOUS BUD FAILURE (BF) is a genetic disorder of almonds that is present in a number of commercial varieties grown in California. Nonpareil, the industry's most important variety, is widely affected in certain sections of the San Joaquin and Sacramento valleys.

Though BF has been recognized for many years, its influence on yield has not been measured. This information is essential to growers facing management decisions with BF trees.

A three-year study was initiated to measure the influence of BF on yield of Nonpareil trees in San Joaquin and Kern counties. The three test orchards were selected as being average or above in production with no outstanding problems except for presence of BF. For example, yields from normal trees ranged from about 1000 to 3500 lbs of shelled nuts per acre. The three-year period was selected to show seasonal variations in yield (due to alternate bearing tendencies), weather, and pollination conditions.

Since BF trees vary in severity of symptom expression it was thought yield would be influenced in a similar manner. Therefore, trees were divided into mild and severe BF groups and these were compared to trees with no observable symptoms (normal). Photos of severe BF and normal trees are shown. Normal trees had no BF symptoms, mildly affected trees displayed BF symptoms in several of the secondary branches, and severely affected trees had BF symptoms in at least one major scaffold with additional symptoms throughout the tree.

Individual tree yields were obtained and calculated in lbs of shelled nuts per tree and converted to lbs of shelled nuts per acre. Further measurements such as individual kernel weights and per cent double kernels were made, because these factors can affect crop value and grower returns.

The graph illustrates yield variations due to BF. Yields from trees with mild BF ranged from 80% to 111% of normal trees over the three-year test period. Except in orchard #3, yields from trees with mild BF were reduced each year. In all trees with mild BF the average yield was

91% of normal trees. Trees with mild BF in orchard #3 outproduced normal trees in two out of three years. This might be explained (especially in 1973) by later bloom on BF trees that coincided with excellent pollination weather at that location. In the same orchard normal trees were in full bloom earlier during adverse weather conditions.

Trees with severe BF showed greater overall yield reductions than trees with mild BF. Except for 1973 in orchard #3, trees with severe BF yielded 32 to 73% of normal trees, with the average yield from these trees being 64% of normal. Again, delayed bloom in the BF-affected trees in orchard #3 coincided in 1973 with better weather and pollination conditions and may have accounted for the single reversal.

Individual kernel weights from trees with severe BF were frequently less than those from trees with normal or mild BF. As nut sample evaluation progressed, it became evident there also were more double kernels in the BF samples. The level was not high nor consistent in all years but a definite trend existed.

In summary, BF does influence almond yields by decreasing kernel weight and numbers. The amount of reduction depends upon the degree of BF symptom expression, with greater yield loss occurring in severely affected trees. Under similar pollination conditions at bloom, the normal trees apparently set more fruit because of more flowers which provide a larger crop potential.

On occasion BF trees may outproduce normal trees. One factor may be random variation in bloom weather conditions that favor later-blooming BF trees.

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EFFECT OF BF ON ALMOND YIELDS

