
RATNAGIRI ALPHONSO ORCHARD: BAYESIAN DECISION ANALYSIS

Debdatta Pal wrote this case solely to provide material for class discussion. The author does not intend to illustrate either effective or ineffective handling of a managerial situation. The author may have disguised certain names and other identifying information to protect confidentiality.

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In November 2012, Nirmal Pansare, the oldest member of the family who owned the Ratnagiri Alphonso Orchard, had to make a decision: Should the family lease the orchard to a merchant immediately, or keep the orchard to harvest themselves despite the risks of an unseasonable or heavy rain? An unseasonable rain during the flowering stage could be harmful, damaging at least 40 per cent of the crop and often ruining the entire crop. However, moderate rains at the time of the fruit's maturity could improve the fruit size and quality.

THE ORCHARD

Ratnagiri Alphonso Orchard was located in the Ratnagiri district of Maharashtra, a state in western India. The district usually experienced four seasons — the summer from March to May, followed by a regular monsoon season with plentiful of rainfall from June to September, post-monsoon season during the months of October and November, and winter season from December to February. However, delayed monsoons could lead to spells of heavy rain until December. The orchard produced only Alphonso mangoes, the premium mango cultivar that had export potential. The orchard was spread over 100 hectares of land. On average, 1 tonne of mangoes was harvested from each hectare of land.

Mangoes were graded according to their weight: grade A for mangoes weighing 100 to 150 grams, grade B for mangoes weighing 150 to 200 grams, grade C for mangoes weighing 200 to 250 grams, and grade D for mangoes weighing more than 250 grams. Each mango was wrapped in tissue paper, packed in a box made of wood or perforated cardboard, and cushioned with paper shavings to protect the fruit from damage. In general, a box contained 10 kilograms of fruit.

ALPHONSO CULTIVATION

Alphonso mangoes were known as the “King of Mangoes” because of their sweet taste, golden-coloured creamy flesh, and fruity aroma.

Alphonso cultivars were planted nine metres apart. Every hectare of land held, on average, 120 to 140 trees. For the first three to four years of growth, it was essential to train the mango trees with regular pruning, which involved removing the shoots close to the ground. Once established, Alphonso trees needed limited annual pruning. Well-nourished Alphonso mango trees usually started bearing fruit within three to five years of planting. The trees were medium height, upright, and spreading.

Flowering in Alphonso mango trees took place from December to January. Unseasonable rain was harmful if it occurred during the flowering period. Another threat was deep frost, which could occur between December and February. To protect the trees from frost, thatches made of paddy straw were erected to block the winds. The southern side of the thatches was kept open for sunshine and aeration. Soil moisture was maintained with irrigation, and dry grass and weeds were burned in open areas of the orchard to increase the air temperature.

Alphonso trees that were bearing fruit were irrigated one week before flowering and then again after the fruit set. To maintain soil moisture, the trees might be irrigated monthly during the winter season, and then every two weeks from April to October.

The trees' requirements for manure and fertilization varied according to the soil type. In general, Alphonso mango trees needed nutrition based on their age, canopy, and productivity. The most suitable temperature for growing Alphonso mangoes was 22 to 27°C. Alphonso fruit ripened during June and July.

PANSARE'S DECISION

Based on the weather report released by the Regional Meteorological Centre, Pansare concluded there was a 50/50 chance that unseasonable rain would hit the Ratnagiri district. Pansare had already invested the equivalent of US\$60,000¹ to maintain the orchard. If rain hit the Ratnagiri region, the crop would suffer at least a 40 per cent loss. That meant that, at best, Pansare would earn \$50,000 in revenues, which meant an immediate loss of \$10,000 on his investment. But, if the Ratnagiri region was not hit by rain, the farm would earn \$90,000 in revenues, which meant a profit of \$30,000. Pansare had yet one other option. A fruit merchant offered to lease the orchard from December 2012 to September 2013 for \$64,000. This offer was tempting because the lease would generate a return of \$4,000 on Pansare's initial investment without incurring the risk of a loss of \$10,000.

A few days earlier, Pansare had learned about a climatology firm that predicted the probability of rain. However, the firm charged a fee of \$1,000. Pansare spoke to the firm's existing clients, seeking information about the accuracy of the firm's past judgments. He found that in 70 per cent of the cases when the Ratnagiri region was hit by rain, the firm had also predicted rain. However, when the firm predicted rain, there was a 20 per cent chance that the rain did not come.

Pansare needed to decide whether it was worth spending \$1,000 to get information from the climatology firm before deciding whether the family should lease the orchard to the merchant immediately, or retain the orchard until the harvest.

¹ All currency amounts are shown in US\$ unless otherwise specified.