The Impact of volcano eruptions on agriculture in Hawaii

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The current "eruption" is actually the most recent episode of an eruption that has been ongoing since the 1980s. There are two interrelated but separate events as of this writing. The one receiving much press is the series of vents that have opened up in Puna on the eastern end of the Big Island, with active lava flows that have entered the ocean. The other is at the summit of Kilauea. The lava formerly in the caldera and underlying reservoir is now flowing to the rift zone. With the lava lake and reservoir now empty, groundwater is seeping in and causing explosive eruptions of ash when the sides collapse and clog the main vent.

Eruptions in Hawaii tend to be milder (in historical times); they are not explosive and do not involve events like pyroclastic mud flows as for many other volcanos. The current eruption at the summit is an exception but has not been as violent as elsewhere. Damage from eruptions therefore are from the lava flow, from ash & emissions, and from earthquakes and possible tsunamis caused by magma movement.

Damaged crops include papaya (a significant portion, if not the majority, of Hawaii papaya production comes from the Puna region), other fruits including avocado and other tropical fruit such as noni, lychee and rambutan, vegetables, nursery and ornamental flowers and foliage (including anthuriums, orchids, potted palms and dracaena), and livestock.

The following are identified as the hazards resulting from the volcanic eruptions, including some comments about how agriculture is affected.

Lava flows result in the total destruction of land, infrastructure and crops. Realistically, there are zero chances of rebuilding on the same site. *Tongue-in-cheek comment: If one were on the coast and covered by lava, s/he would lose the value of having oceanside property. The plus side is the acreage might have increased, and significantly. The ongoing eruption has added over 300 acres in covering Kapoho Bay. However, the land is very unstable; it could break off and slide into the depths at any time.*

Emissions ranging from boulders to particulate matter and gases

- Bombardment from rocks, pebbles, cinder, "Pele's hair" (glasslike strands) if close to eruption. Besides mechanical damage, these can also be hot enough to cause burns and start fires.
- Ash from Kilauea eruptions is powdered rock and can act like powdered cement. If not blown or washed off completely, ash can harden into a shell. In the case of coffee growers in Kau, growers are not sure whether the hardened ash will damage processing equipment and if so, how it would be removed from the harvest.
- Gaseous emissions. Sulfur dioxide burns crops and will kill animals and humans with sufficient concentrations and prolonged exposure. Gaseous emissions react with atmospheric vapor to form vog, which can affect the entire island chain if weather conditions are right. Concentration decreases with distance.
- Rain falling through vog is acidic (the SO_2 based reaction forms sulfuric acid). At CTAHR's Volcano Experiment Station, irrigation water comes from a reservoir that captures runoff from buildings. The pH of that water is in the mid 4s.
- Acid rain leads to corrosion of metal including roofing, nursery structures, machinery & equipment, and fencing. Over the years, Hawaii ranchers have received millions in assistance

via FSA programs to repair fencing and infrastructure. Acid rain also leaches lead (from roofing nails, old pipes) into catchment water, which historically has been and continues to be the water source for many.

- Fluoride effects on livestock. Fluoride from emissions on grass, in turn consumed by livestock, has caused fluoride toxicity especially in calves leading to major birth defects/problems with bones and teeth. Many are stillborne or unable to stand after birth. The effects of other minerals and heavy metals originating from emissions are not known.

Damage to supporting infrastructure. This includes destruction of roads, water, and power systems. A geothermal plant that produced 20%+ of the island's electrical power was destroyed a few weeks ago.

Loss of access. Even if the farm and crops were spared from direct damage, crops are essentially lost if the producer cannot access the farm and/or has lost needed water and/or power. In the case of the nursery industry, the main source of potting media (cinders from old deposits) have been cut off, leaving growers scrambling to find more expensive (and often inferior) substitutes.

Lava flows have surrounded numerous areas and cut all routes to others, and loss of access can also result from cracks in the earth that might widen further, and have that have been precursers to active vents. Besides physical barriers, government have also limited or stopped all access for health and safety reasons (for both residents and sightseers), to minimize disruption of operations, and to keep out looters.

Labor disruption. The impacts on humans affect both farmers and farm laborer. Acute exposure to emissions is deadly while the vog and ash cause a number of health effects including burning eyes and respiratory issues. Young and elderly and those w/respiratory problems are especially affected. Many suspect that chronic exposure is the cause of more asthma cases. Kau is usually blanketed by ash each time Kilauea explodes, so coffee growers have expressed concern for their pickers once harvest begins, and are anticipating a labor shortage as workers choose to work farther away.