

Low Technology Hydroponic Methods for Growing Potatoes in Hawaii

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Hawaii grows less than 1% of the potatoes which it consumes, because growers are discouraged by soil and foliage diseases, nematodes, high rainfall and even lack of soil in some potential growing areas. There is a high value gourmet potato market in Hawaii for which an intensive growing system would be economically feasible. However, sophisticated hydroponic systems are too challenging for many growers, and conventional container growing techniques require too much growing medium which is very expensive in Hawaii. Thus, there is a need for a low technology hydroponic growing system with a low growing medium requirement.

Experiments were conducted at an 800 m elevation greenhouse site in Hawaii. Initially, potatoes were planted in 18.9-liter bags containing 5.6 liters of commercial growing medium for 2 plants which were 'hilled' with dry grass to save growing medium. Yields of around 5 kg of salable potatoes/square m of tank were obtained. The growing medium cost more than US\$1/kg of salable potatoes. However, this was reduced to US\$0.86/kg of salable potatoes when only 2 liters of media were used per plant, but this was still too expensive for a commercial growing operation.

Various production methods were explored in an effort to reduce the growing medium requirement. Growing medium usage was reduced by 70% when potatoes were planted in elevated 10-cm pots, and this reduced the growing medium cost to \$0.24/kg of salable potatoes. However, the growth appeared to be somewhat restricted. A growing medium cost of \$0.34 per kg of salable potatoes was achieved when a nursery tray contained 0.5 liters of growing medium per plant (+ hillings of dry grass). The tray was elevated above a 5 cm depth of non-circulating nutrient solution. A somewhat lower yielding, sub-irrigated pot-in-pot method only required 250 ml of growing medium per plant with a growing medium cost of \$0.25 per kg of salable potatoes.

The need for commercial growing medium was eliminated by two growing methods.

In the first method, seed tubers were wrapped in newspaper and elevated above the nutrient solution. A portion of the newspaper was submerged in the nutrient solution, so it became moistened by capillary action. This method provided good yields but wrapping was time consuming and required some skill. In another method, the seed potatoes rested on an elevated paper towel wick. The method was easy to install, but yields were lower than from an elevated tray method conducted at the same time.

A locally available inexpensive wood chip medium was explored. Potatoes grew as well in the wood chip medium as in peat-perlite in one trial, but not in another trial.

Higher yields were obtained from 52 g seed tubers than 4 or 20 g tubers. Different cultivar responses were observed; *Huckleberry* yielded lower than *All Blue*, *Catalina* or *Yukon Gold*.