Economics

- The current expendable launch system in the USA (Antares) costs 6,000 dollars per pound to get a payload into low earth orbit (LEO).
- Getting the water needed for a traditional aquaponics system for one person would cost over 1.8 million dollars to get into LEO. Multiply this by the number of crew and you quickly run into significant expense.
- Aeroponically watering plants could save some water weight. If a system is being used for planetary colonization, then it may be possibly to synthesize water from elements found on the surface.
- Any long term mission will need some way of producing their own food. Output from a system like this will need to be exceedingly efficient because the crew will likely have other duties.

Current State

- NASA has explored aquaculture on the ISS, so far the results have been less than ideal. Fish require gravity to thrive, bone loss and a high mortality were found in the experimental fish.
- Artificial gravity could be induced through a spinning or rotating section of a spacecraft. This would be beneficial for the crew as well as the fish.
- More research is needed to develop fish that can withstand the rigors of spaceflight.
- It may be possible to preserve fish and/or eggs for a long spaceflight to seed a planetary aquaponics system on Mars or elsewhere.
- Mars One, an extremely ambitious program to establish a human settlement on Mars, would require a sustainable, closed loop food production system for its crew. Aquaponics may be the answer.

Logistics

- A traditional aquaponics system large enough to support one adult would need to have a fish tank of at least 365 gallons and a grow area of at least 365 square feet, if you follow the one fish per square foot per gallon of water rule.
- If we provide for advances in techniques and technology, these requirements could possibly be reduced by up to half.
- Bright Agrotech has developed a growing media that can filter a much larger amount of water than traditional media.
- New fish varieties can be bred for rapid growth and higher stocking densities. Tilapia are the most promising when it comes to rapid growth.
- Feeding the fish is an issue that needs to be addressed. Efficient vermiculture seems to be the best option.