

## Crop Readiness Level (CRL): A Scale to Track Progression of Crop Testing for Space

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The development of engineering technologies and hardware for aerospace applications is often tracked on a 1-9 scale of readiness or TRL, with a “1” representing very basic or fundamental principles, and a “9” being flight tested, functional hardware. Preparing to grow crops for supplemental food and eventual life support contributions on space missions faces similar challenges. Nearly 20 years ago, the concept of a “crop readiness level” was suggested at a bioregenerative life support conference held at Kennedy Space Center, but there was little follow up to this. We propose to revive this concept to track the preparation and testing of different crop species for eventual use in the unique environment of space. For the sake of uniformity, we recommend a 1-9 scale, with a “1” being just the identification of a potential crop, followed by some basic horticultural testing, cultivars trials, then testing growth and yield under various controlled environments, progression to more space-like environments and hardware, understanding the nutritional, organoleptic, and food safety aspects of the crop, initial testing in space, and a final stage of growing the crop for food in space (“9”). We attempted to make the scaling logical and progressive, but our main goal is to initiate a dialogue in the space, plant research community to develop a scale for assessing crop readiness.