The Hydroponic Garden Experiment

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So What

As military operations evolve from Population-centric Counterinsurgency (COIN) to Large-Scale Combat Operations (LSCO), there's an increasing need to adapt and enhance logistical support systems to maintain operational effectiveness across diverse and challenging environments. This shift is particularly crucial in Multi-Domain Operations, where agility, convergence, endurance, and depth are critical factors in achieving strategic objectives (PDF 3-2397 Sustainment Operations in Large Scale Combat Operations, 2023). In this dynamic context, introducing Hydroponics Tactical Gardening systems into Field Feeding operations represents a significant innovation under the Shaping Tomorrow initiative. These systems are designed to revolutionize Class 1 ration sustainment operations by leveraging advanced hydroponic technology to grow fresh produce directly at or near operational sites. This approach enhances the nutritional value and variety of food available to deployed forces, reduces logistical footprints, and improves self-sufficiency. According to Field Manual 5-0, Planning and Procedures, the art of planning requires the creative application of doctrine, units, and resources. Implementing these tactical hydroponic systems aligns with the broader goal of maximizing the potential of austere environments and boosting the autonomy and endurance of military forces during high-intensity conflicts. By integrating such innovative solutions into Class 1 operations, the military can significantly enhance its ability to sustain its personnel in diverse operational contexts, ensuring that troops are well-nourished, more resilient, and ready to perform at their best (Army Regulation 40-25, 2017).

Introduction

The 166TH RSG Field Feeding Detachments, in collaboration with the Army, Go 4 Green program, conducted a groundbreaking 29-day hydroponic garden experiment during WAREX 87-23-01 at Fort McCoy, WI. This experiment's primary objective was to explore the holistic health and fitness (H2F) benefits of nutritional and mental well-being and organic self-sustainment methods for Army Field Feeding Detachments. The goal was a continuous supply of dietary vegetables and herbs for a 150-person company during Large Scale Combat Operations (LSCO). The experiment sought to address wartime challenges of sourcing fresh produce, the enhancement of Unit Group Rations (UGRs), the reduction of military produce costs, and the added benefit of a therapeutic outlet for Soldiers experiencing mental stress.

The Endurance of Hydroponics Tactical Gardening Sustainment

Incorporating hydroponics into military operations as a supplement to traditional food procurement methods produced by civilian agencies offers several strategic advantages, particularly in enhancing the logistical and operational efficacy of military forces engaged in extended campaigns. Reduced Logistic Footprint Traditional food supply chains in military settings often involve complex logistics, including procuring, storing, and transporting perishable goods over long distances (Field Manual 4-0 Sustainment, 2022). This increases the risk of supply disruptions due to enemy action or logistical failures and ties up critical resources and manpower in supply chain management. By integrating

hydroponics— a method that allows for the on-site cultivation of vegetables, spices, and herbs—military operations can significantly reduce their reliance on lengthy supply lines. This reduction in logistical footprint decreases the vulnerability of forces to attacks aimed at supply routes and frees up resources for other operational needs, such as:

1. Enhanced Operational Endurance: The ability to grow fresh produce on or near the battlefield provides military commanders with an enhanced endurance posture. Tactical hydroponics ensures a steady and controllable supply of fresh nutrients, particularly valuable in austere or remote environments where traditional supply lines might be compromised or non-existent. The self-sufficiency afforded by hydroponics allows units to maintain operational readiness over more extended periods without the need for resupply, which can be critical in prolonged engagements.

2. Boosted Morale and Health: The availability of fresh food, such as vegetables, herbs, and spices, plays a significant role in maintaining soldier morale and health. Fresh produce diversifies the diet, improving the palatability and variety of meals and providing essential nutrients that help keep soldiers' physical and mental well-being. This is particularly important in high-stress combat situations, where optimal physical and mental conditions are crucial for performance.

3. Adaptability and Scalability: Hydroponic tactical systems can be adapted to various environments and scaled according to need. Whether in temperate, arid, or tropical climates, these systems can be adjusted to provide optimal growing conditions for a range of produce, making them suitable for diverse operational theaters. Additionally, hydroponic systems can be scaled up or down based on the size of the troop deployment, providing flexibility in food production directly correlated to operational demands.

4. Environmental Sustainability: Hydroponics is a water-efficient agriculture technology, using up to 90% less water than traditional soil agriculture. This aspect of hydroponics is especially beneficial in regions where water resources are scarce or need to be conserved for local populations. Furthermore, hydroponics contributes to an environmentally sustainable approach to military logistics by reducing the need for transport and the associated carbon footprint. Agility Tactical usage revamping our Food Operation systems space saving technology to move and sustain forces and to adjust commanders' disposition and aggressiveness more rapidly than the enemy.

Experiment Details

The experiment took place in USDA Hardiness Zone 5a, a challenging Wisconsin climate characterized by distinct seasons and significant variations in precipitation and temperature. The hydroponic garden included a variety of vegetables commonly used by Culinary Arts Specialists, such as onions, chives, jalapeno peppers, iceberg lettuce, red lettuce, parsley, rosemary, bell peppers, basil, and sweet basil. Two hydroponic systems were employed: the VIVOSUN Hydroponics and the LAPOND Hydroponic growing system, which are capable of supporting 108 plant sites across 3 layers. These stackable

systems were selected to optimize battlefield space and utilize Food Safe PVC pipe to align with a holistic approach to Logistics Package Operations.

Challenges

The experiment encountered unpredictable weather conditions from late May through June 2023, with temperatures ranging from 91 degrees Fahrenheit during the day to as low as 29 degrees Fahrenheit before sunrise. Managing these extreme temperature fluctuations posed a significant challenge. To address these challenges, we employed innovative solutions, including using woodland camouflage netting to regulate direct sunlight exposure and inserting fish tank heat pumps inside 5-gallon water buckets to prevent water from freezing at night.

Depth Benefits and Outcomes

Hydroponic systems enable the on-site production of fresh produce, reducing the need for extended supply chains vulnerable to disruption and requiring significant energy and resources to maintain. This immediacy in food supply can be critical in combat zones where traditional supply lines are compromised. Growing food close to or within military bases ensures a consistent, reliable source of nutrition, enhancing the self-sufficiency and resilience of military units. This is particularly beneficial in isolated or harsh environments where external resupply is challenging or risky (Field Manual 3-0 Operations, 2022). Despite the formidable challenges posed by the Wisconsin climate, the hydroponic garden experiment yielded several remarkable benefits:

Cost Reduction and Sustainability: The experiment demonstrated that Army Field Feeding Detachments can reduce production costs while ensuring sustainability during large-scale combat operations. The detachment significantly reduced reliance on external sources by growing fresh produce on-site without pesticides or chemicals.

Scalability and Adaptability: Hydroponic systems are highly adaptable to different climates and settings and can be scaled to meet the needs of units of various sizes. Hydroponics can be adjusted to provide an appropriate scale of food production, whether for a small forward-operating base or a more extensive established base. This flexibility ensures that the benefits of hydroponics can be realized across a wide range of scenarios and operational demands.

Mental Domain and Well-being: The garden served as an essential therapeutic outlet for Soldiers facing mental domain challenges. Many Soldiers sought solace in connecting with the earth and participating in garden maintenance. It provided an opportunity for relaxation, emotional release, and an avenue to decompress, ultimately contributing to improved mental well-being. The quality and variety of food available to soldiers directly impact morale and health. Hydroponic systems allow for cultivating various vegetables and herbs, providing fresh ingredients that improve meals' taste and nutritional value. This not only boosts morale but also supports the physical health of soldiers, which is essential for maintaining combat readiness.

Camaraderie and Team Building: The garden fostered camaraderie among Soldiers, even those from different units. Several Soldiers voluntarily attended the garden before or after their regular work shifts. This communal activity enhanced unit cohesion and facilitated positive interactions among personnel.

Go For Green (G4G) Initiative

Hydroponic gardening systems present a unique convergence of operational efficiency and environmental stewardship, aligning seamlessly with the Army's Go Green initiative even during large-scale combat operations. This innovative approach to agriculture not only enhances the logistical capabilities of the Army but also demonstrates a commitment to sustainable practices, which are increasingly crucial in modern military operations. Reduced Environmental Impact: Implementing hydroponics as part of the Army Go for Green (G4G) initiative underscores the commitment to reducing environmental impact. Hydroponic farming uses substantially less water than traditional soil-based agriculture—a crucial factor in areas where water is scarce or conservation is a priority. Additionally, by localizing food production, the Army can significantly reduce the carbon emissions of transporting food supplies from distant sources.

Modern hydroponic systems can be integrated with renewable, energy efficient sources such as solar or wind power, further reducing the ecological footprint of military operations. These systems can operate efficiently on low-power inputs. They can be configured to utilize energy from portable renewable sources, making them ideal for deployment in forward or remote operating bases. Promoting Sustainability as a Strategic Advantage: By embracing hydroponics and the broader Go Green initiative, the Army enhances its operational capabilities and positions itself as a leader in sustainable military practices. This commitment can serve as a strategic advantage, improving the Army's image and relations with local and global communities and demonstrating an innovative approach to the challenges of modern military engagements. Incorporating hydroponic gardening systems into Army operations is more than a logistical solution; it is a strategic approach that supports the Army's operational goals while advancing its commitment to environmental responsibility and sustainability. This alignment enhances the operational readiness of the Army, fosters innovation, and contributes to a more sustainable approach to military engagements.

Conclusion

The tactical hydroponic garden experiment at Fort McCoy, WI, demonstrated the potential benefits of using hydroponics by Army Field Feeding Detachments. The demonstration displayed benefits across H2F, particularly emphasizing cost-effectiveness, sustainability, and mental domain support. This initiative approach demonstrated the adaptability of Army units to address nutritional and mental domain domains in an LSCO environment. Incorporating hydroponic tactical gardening systems into Army operations is more than a logistical solution; it is a strategic approach that supports the Army's operational goals while advancing its commitment to environmental responsibility and sustainability. This alignment enhances the operational readiness of the Army, fosters innovation, and contributes to a more sustainable approach to military engagements. The success of this experiment suggests that integrating hydroponic gardens into field operations warrants further exploration and consideration as a viable strategy for Army units. Integrating hydroponic farming into military logistics is a forward-thinking strategy that enhances operational effectiveness, endurance, and sustainability. It provides a robust solution to several logistical challenges military operations face, ensuring that forces remain agile, well-nourished, and ready for prolonged engagements. It underscores the Army's unwavering commitment to holistic health and fitness, ensuring the well-being of our greatest asset, our Soldiers.

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