NUTRITION-SENSITIVE AGRICULTURE

Growing More with Less

Learning from a hydroponics pilot in the Healthy Village Programme

Lettuce in hydroponic channels with oat fodder trays between them, Woramit Horticulture Research and Training Station.

Why was this pilot tested?

In many areas of Ethiopia, households face increasing pressure on water, land, and food production. Seasonal rainfall, limited irrigation access, poor soil conditions, and climate-related shocks make it difficult for families to produce diverse and nutritious foods throughout the year.

THE QUESTION BEHIND THE PILOT

Can communities produce more nutritious food using fewer natural resources?

As part of the Healthy Village Programme, a hydroponics pilot was tested to explore whether a locally adapted, water-efficient production system could support vegetable and fodder production. Hydroponics is a method of growing plants without soil, using water and nutrient solutions instead. Because the water and nutrients can be reused within the system, hydroponics has the potential to reduce water use, make production less dependent on soil quality, and support food production in areas where land or water are limited.

For Healthy Village, the relevance of hydroponics rests on whether this type of system can become a practical, affordable, and locally managed option for households, farmers, youth enterprises, schools, or demonstration sites. The pilot therefore explored not only plant growth, but also the use of locally available nutrient sources, locally fabricated structures, training needs, and the role of youth enterprises in supporting adoption.

Pilot at a glance

Woramit station
Horticulture Research & Training Station, 2025

2
ccrops: lettuce & oat fodder

14
farmers & professionals trained

6
organic nutrient solutions tested

The hydroponics pilot was conducted at the Woramit Horticulture Research and Training Station in 2025. It focused on two crops — lettuce for vegetable production and oat fodder for animal feed — and tested both the physical hydroponic structure and the nutrient solutions used to support plant growth.

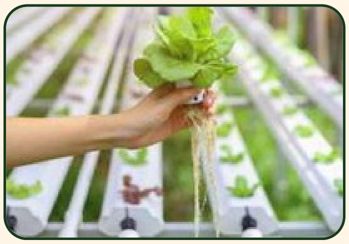
The system was designed using fibre materials, selected because of their durability, resistance to harsh weather conditions, and ease of handling and maintenance. The structure included germination trays, transplant cups, vessel boxes, and supporting frames. It was covered with plastic and netting to protect crops from excessive rain, wind, and temperature fluctuations.

HOW THE SYSTEM WORKS IN PRACTICE


1. Seeds are started in germination trays.


2. Seedlings move into net transplant cups.


3. Cups sit in channels fed by nutrient solution.


4. Roots grow in water, without soil.

A total of 14 participants were trained, including farmers and professionals from the Organisation for Rehabilitation and Development in Amhara (ORDA) and the district agricultural office. The training covered preparation of nutrient solutions, seedling management, hydroponic system operation, monitoring of plant health, and efficient use of water and nutrients. Practical demonstrations were included so participants could gain hands-on experience.

The pilot tested several locally available and organic nutrient solutions, including vermicompost tea, cow dung tea, chicken manure tea, liquid organic fertilizer, artificial fertilizer, and combinations of these. This was important because many hydroponic systems depend on commercial nutrient solutions that may be too expensive or difficult to access for smallholder farmers. Testing local nutrient sources was therefore central to understanding whether hydroponics could become more affordable and practical in the local context.

What did the pilot show?

The pilot showed that hydroponic production using locally available nutrient sources is technically possible. The results were especially promising for lettuce production, where vermicompost tea performed better than the other nutrient solutions tested.

Best performer

Vermicompost tea, on lettuce

Highest plant height, leaf length, leaf width, root biomass, and leaf yield across the solutions tested. Cow dung tea also performed reasonably well, especially for root growth and moderate yield.

Research and programme staff reviewing the lettuce trial on site.

Oat fodder grown in trays for animal feed.

This suggests that locally available organic nutrient sources can support hydroponic vegetable production when they are properly prepared and managed.

The oat fodder trial also showed promising growth performance and was seen as potentially relevant for urban and peri-urban areas. However, before making strong recommendations for livestock feeding, further analysis is needed — in particular, the nutritional quality and chemical composition of the fodder, as well as the cost-benefit of producing fodder through hydroponics compared to other feeding options.

The pilot also showed that local youth enterprises can play an important role in making this type of innovation more practical. A youth enterprise supported the design, fabrication, installation, training, maintenance, and monitoring of the hydroponic systems. This is an important lesson for scale-up: hydroponics is unlikely to spread only through one-off training. It requires ongoing technical support, maintenance capacity, and local service providers who can help users solve practical problems.

What makes this promising?

1. **It can reduce dependence on soil.** This is relevant where soil quality is poor, land is limited, or soil-borne diseases affect production. It may also suit schools, youth groups, demonstration sites, or households with limited growing space.

2. **It can use water more efficiently.** Compared with traditional soil-based production, this makes hydroponics interesting for areas facing water scarcity or seasonal rainfall challenges. This potential still needs to be assessed under real field conditions, including actual water availability, water quality, and management time.

3 **Local organic nutrients could cut costs.** Using local nutrient sources could reduce dependence on expensive imported or commercial solutions. The strong performance of vermicompost tea is particularly relevant, as vermicompost can potentially be produced locally with the right inputs, skills, and quality control.

4 **Waste can become a productive input.** Materials such as cow dung and chicken manure can potentially be transformed into productive inputs, creating a link between agriculture, environmental health, and circular resource use. Safe preparation, hygiene, and consistency of nutrient content need further attention.

5 **It can create opportunities beyond food.** The involvement of a youth enterprise shows hydroponics could support system construction, installation, repair, training, input supply, and follow-up — making it relevant not only as a production technology, but as a possible local business and service model.

What are the limitations?

Although the results are promising, the pilot does not yet show that hydroponics is ready for wide-scale household adoption. Several practical questions remain.

Management intensity

Hydroponic systems require regular attention. Nutrient solutions need careful preparation, water levels need checking, and plant health needs monitoring. Without regular management, plant growth can be affected quickly.

Accurate measurement

Maintaining the right pH and electrical conductivity is important for plant growth, but this requires instruments, skills, and confidence. If solutions are mixed incorrectly, or pH and EC are not monitored, yields may decline.

Variation in nutrient quality

Vermicompost, cow dung, and chicken manure teas can differ depending on raw materials, preparation method, storage time, and dilution. Farmers may not always get the same results unless simple, clear, locally tested preparation protocols are developed.

Cost and labour

The pilot demonstrated technical potential, but further work is needed on whether the system makes economic sense — the cost of the structure, inputs, labour, water, maintenance, and replacement parts, compared with the value of the vegetables or fodder produced.

Nutrition relevance

Lettuce is useful, but not necessarily the strongest crop from a nutrition perspective. To contribute meaningfully to nutrition outcomes, future testing should consider crops that are both feasible in hydroponic systems and more directly relevant to dietary gaps, such as leafy greens rich in micronutrients.

What does this mean for scale?

The pilot shows that hydroponics can work under local conditions when the structure is adapted, nutrient solutions are carefully prepared, and technical support is available.

Hydroponics may not be appropriate for every household. It may be more realistic as a targeted solution for specific users — motivated farmers, youth enterprises, schools, farmer training centres, urban and peri-urban producers, or demonstration sites linked to nutrition-sensitive agriculture. These users may be better positioned to manage the system, monitor nutrient solutions, and connect production to markets, school meals, livestock feeding, or community learning.

A strong scale model would need more than equipment. It would require training, follow-up support, access to pH and EC meters, clear nutrient preparation guidance, reliable local input supply, and local enterprises that can build and maintain the systems. It would also require evidence on costs, labour, yields, crop quality, and user demand.

The role of youth enterprises is especially important. If they can fabricate affordable systems, provide technical support, and develop a viable business model around installation and maintenance, they could become a key part of the scale pathway — though this business model still needs to be tested.