

The New Paradigm- Hydroponics Technology

Kapare P. B, Kolekar A.B, Palghadmal R. M and Gaikwad S. R.

Assistant Professor, Sadguru College of Agriculture, Mirajgaon, Maharashtra

SUMMARY

Today, hydroponics is used in harsh climates such as deserts, areas with poor soil or in urban areas where high land costs have driven out traditional agriculture. Hydroponic fodder production is probably best-suited to semi-arid, arid, and drought-prone regions of the world, suffering from chronic water shortages or in areas where irrigation infrastructure does not exist. Hydroponic fodder production is a boon for farmers whose soil is rocky and infertile. It is a viable farmer friendly alternative technology for landless farmers for fodder production. Fodders including maize, barley, oats, sorghum, rye, alfalfa and triticale can be produced by hydroponics.

INTRODUCTION

Green fodder is the natural diet for livestock. Its production to meet the current demand has become a greatest challenge among livestock farmers. Due to many reasons, green fodder production has been facing a serious crisis and so the livestock productivity. Due to increasing intensive system of rearing livestock, the need for green fodder is enormous. As the gap between the demand and supply of the green fodder for livestock becoming unconquerable, researchers and farmers are in search for an alternative fodder or fodder production method, that would restore fodder and livestock production. Hydroponics is the state of the art technology that has revolutionized the green fodder production in the 21st century. Hydroponics is a method of growing green fodder without soil in an environmentally controlled houses or machines. Many of the livestock farmers are switching to hydroponic fodder production from conventional production methods, as the fodder produced by this method are highly nutritious, provide sustainable fodder production round the year and conserve water .

Importance of Green Fodder

Natural diet for animals. Improves fat percentage in milk. Rich in beta carotene and helps in synthesis of vitamin A. and Vitamin A has greater impact on reproduction.

Types of Hydroponics Systems

There are six major types of hydroponics systems though it can be categorized into "active and passive" and "recovery and non-recovery" type. No matter which method it is the principle components of a hydroponic system is, moisture, oxygen and nutrient.

- Wick System: Capillary movement of the wick is used to deliver the nutrient solution to plant root from the growing tray after it has been pumped from the reservoir. This type of system is easy to establish but is not suitable for larger systems.
- Deep Water Culture System: In this the roots of plants are directly suspended into the oxygenated nutrient solution. It is also low cost but not suitable for larger systems and plants with longer growing period.
- Nutrient Film Technique: The nutrient solution is continuously pumped into the growing tray and unused solution is collected back to the reservoir. Susceptible to system failures and suitable for larger systems.
- Drip system: Nutrient solutions are made available to the plants through a network of drip system timely with the help of a timer. Suitable for larger gardens but pH fluctuation may be a problem.
- Aeroponics: The roots of plants are suspended in the air and are moistened using the sprinklers continuously within short span of time. It has good root aeration but a bit costlier than other system and is vulnerable to drying if any system failure occurs.
- Ebb and flow system: It is also known as flood and drain system. Here the nutrient solution is flooded into the growing tray and then again collected back using a pump. It is best suited for water carving plants like lettuce.

Hydroponic Green Fodder - Why?

- Saves water: Consumes 98% less water than conventional method and the used water is recycled.
- Reduced growth time: Takes only 8 days duration to develop from seed to fodder while it took 45 days for a conventional fodder to grow. Enhanced nutritive value – as the fodder contains the seed along with the fodder, it has higher crude protein content than conventional green fodder.
- Marginal land usage: Up to 1000 kg green fodder can be produced from 480 square feet area daily which is equivalent to conventional fodder (Co4) produced in 25 acres of cultivable land. Use 99% less land than conventional production method.
- Constant supply: Fodder can be produced round the year irrespective of the failure of monsoon, land availability, natural calamities, labour shortage. Promotes sustainable agriculture and livestock production.
- Requires minimal man power and time: Only 2 -3 hours of work daily doesn't involve technical work. Farmer can do the work without difficulty.
- Completely natural and organic: Fodder is grown completely natural without the use of any pesticides.
- Optimal production cost: Production cost is optimal when compared to conventional fodder production. > Cost of production is 3.50 INR / kg of hydroponic maize fodder. Hydroponic machine (1000 kg capacity) consumes only 40 units of current per day.
- Reduce feed cost: As the fodder contains more crude protein than conventional fodder it reduces the feed cost spent on the concentrate feed to half.
- Nutritious fodder: Hydroponic fodder along with seed and root (sprout mat) are highly edible and are rich in protein (10 – 17%). Ideal nutrients enriched fodder for livestock.

What can be grown as a Fodder?

Yellow Maize, Cowpea, Horse gram, Sun hemp, Ragi, Bajra, Foxtail millet and Jowar has been grown successfully and received good response from the livestock as a fodder.

Nutritional composition of different hydroponic fodder

Sr. No	Type of hydroponic fodder	Day of growth	Moisture %	% Dry matter basis				
				CP	CF	EE	TA	NFE
1	Maize	8	76.75	10.55	5.51	4.62	1.80	77.52
2	Horse gram	4	90.18	30.26	13	2.06	5.43	49.25
3	Cowpea	4	77.93	27.84	6.51	1.93	4.88	58.84
4	Bajra	4	74.80	9.22	4.16	4.57	1.49	80.56

Drawback of Hydroponics: Experiences and technical knowledge. Organic debates. Water and electricity risks. System failure threats and Initial expenses

CONCLUSION

Hydroponic fodder systems make the most sense for organic and/or grass-fed livestock operations, smaller family farms, "hobby operations" and horse stables. It can be a major feeding option when pastureland and/or hay are in short supply, or add a highly nutritious and relished supplement to traditional grazing.

REFERENCES

- Butler, J.D. and Oebker, N.F. (2006). Hydroponics as hobby growing plants without soil. Circular 844, Information Office, College of Agriculture, University of Illinois, Urbana, IL 6180p.
- Rachel Jemimah, E, P. Tensingh Gnanaraj, T. Muthuramalingam and T. Devi: Hydroponic Green Fodder Production Tamil Nadu Veterinary and Animal Sciences University; 2015
- Wangkhem Tampakleima Chanu, Konjengbam Sarda Devi1, Kota Chakrapni1and Baby Wangkhem (2020) Hydroponics: An Advanced Technique for Vegetable Production AgriCos e-Newsletter 1(3) 70-71.