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# Hydroponic Maize Fodder Production - Need for Small and Marginal Farmers

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## Abstract

Hydroponics means growing of plants without soil. The same technique is followed for growing green fodder without soil. It can be grown either in environmentally controlled houses or inside machines. Owing to green fodder scarcity and reduction in cultivable land for fodder production, the livestock farmers are slowly switching over to hydroponic fodder production from conventional production methods. These techniques will give a helping hand where there is a minimum available source of water for irrigation. These fodder produced are highly nutritious, provides sustainable fodder round the year and conserve water. This system suits small to marginal scale farmers.

## Introduction

In India, livestock plays an important role for the nutritional security, particularly of the small and marginal farmers. The increase in livestock population along with the intensive rearing system has resulted in increased demand for feeds and forages in the country. The feed scarcity has been the main limiting factor in improving the livestock productivity (Brithal and Jha, 2005). Green fodder is the natural diet for livestock. Dairy animals producing up to 5-7 liters of milk per day can be maintained exclusively by feeding green fodders. Inclusion of green fodders in ration of dairy animals decreases amount of concentrate feeding and thus increases profit. Therefore, for economical and sustainable dairy farming, fodder production round the year is highly essential.

Hydroponics is the state of the art technology that has revolutionised the green fodder production in last two decades. The word hydroponics in fact implies working water, originating from the Latin words "hydro" which means water, and "ponos" which means work (Anbarasu *et al.*, 2020). Mostly farmer uses Maize seeds to produce hydroponic fodder. In cold climatic condition wheat and oats seed are good while in hot climatic condition maize seeds are suitable for hydroponic fodder production. Though this method has made a greatest impact in the fodder production system, most of the farmers are facing some practical difficulties in profitably running the hydroponic machine for sustainable fodder production. Hydroponic fodder systems are usually used to sprout cereal grain such as barley, oats, wheat, sorghum, and corn or legumes such as alfalfa, clover or cowpea. Fresh green grass sprout fodder (6 to 8 days old) is a very nutritious and economical feed for all grazing animals including cattle, horses, hogs, sheep, goats, rabbits, etc. Development of this planting system has enabled the production of fresh forage round the year from maize, oats, barley, wheat and other grain.

## Production of Hydroponic Maize Fodder

The hydroponic fodder from maize grain (*Zea mays*) can be grown in a conventional green house. This conventional green house is established using green shade net, set of sprinklers and a 0.5 Hp motor. The ambient temperature should be maintained between 15 and 32 °C and that of relative humidity around 80-85 %. A controlled environment at least cost to allow good growth with a daily production capacity of 60 to 80 Kg fresh hydroponic maize fodder (Figure 1). The average height of hydroponic maize fodder is 20–25 cm at the time of harvest.



Figure 1: Various growth stages of hydroponic maize fodder raised under shade net

### Step Wise Procedure

- Initially Maize grains are to be cleaned with 0.1% hypochlorite solution and then washed under fresh tap water to remove residues. This process will reduce the chance of mould attack during consecutive process.
- Then grains were then soaked for 24 hours. At this stage, the immature seeds will start to float on the top which can be removed for uniform growth.
- The soaked seeds are put in a wet gunny bag and allowed to sprout for 24 hours.
- The sprouted seeds were transferred into properly washed trays @ 3 Kg per tray of dimensions 30 × 18 × 2 inches.
- These trays are placed over the racks and spread out evenly.
- The racks are constructed with UPVC pipes for longer durability and for firm hold of the trays.
- Every day on the top of the racks water sprinklers are arranged which are connected to 0.5 hp motor attached with timer. The timer is set up in such a way that the water sprinkles for one minute for every one hour from 6 AM to 12 AM. Thereafter it is sprinkled for every half an hour until three PM.

Followed by one-minute sprinkle for hourly interval until 6 PM.

- This sprinkling will give necessary humidity and water for necessary growth of the maize.
- The small holes in the trays will drain off excess water thereby preventing water stagnation and mould growth.
- The hydroponic maize fodder can be harvested on the 8<sup>th</sup> day. The average yield varies from 18- 20 kg/ tray of above mentioned size.
- This will be sufficient for feeding one or two milch animal with moderate milk yield.

### Advantages of Hydroponic Maize Fodder

- It has more nutrient than the conventional grown fodder. It is rich in vitamins and minerals.
- It requires only a week time for harvest whereas it takes months together in traditional farming system.
- It often requires only 3-4 litres of water per kilogram of hydroponic fodder production.



Day 1 - Sprouted maize seed



Day 3 – Growth of the maize seeds



Day 5 - Growth of about 7 cm



Day 8 – Harvest stage

Figure 2: Different growth stages of hydroponic maize fodder.

- It can be produced throughout the year overcoming the seasonality based cultivation practises.
- It doesn't necessitate the spraying of pesticides.
- It requires only fewer places and less labour force.
- Feeding of hydroponic maize fodder will marginally increase the milk yield (Raghavendran *et. al.*, 2019).

## Conclusion

Hydroponic fodder production will be a good alternate for landless small and marginal farmers. High nutritive value hydroponic fodder will enhance the milk production marginally. This will reduce the use of virtual water used for irrigation in conventional farming system.

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