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Research Paper

NUTRITIVE VALUE OF HYDROPONIC YELLOW MAIZE FODDER AND CONVENTIONAL GREEN FODDERS—A COMPARISON

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The study was conducted to assess the nutritive value of hydroponic maize fodder and compare it with nutritive value of conventional fodders like CO4 grass and yellow maize fodder. Hydroponic maize fodder was grown using hydroponic machine for a period of 8 days. The nutritive value of CO4 grass and conventional yellow maize fodder were also assessed after 45 days and 60 days of growth period respectively. Hydroponic yellow maize fodder has significantly higher moisture (76.75%), CP (10.55%), EE (4.62%) and NFE (77.52%) content than land grown yellow maize fodder and significantly lower CF (5.51%) and TA (1.80%) than CO4 grass and land grown yellow maize fodder.

Keywords: Hydroponic maize fodder, Yellow maize fodder, CO_4 grass, Nutritive value

INTRODUCTION

Green fodder is the natural diet for livestock. Its production to meet the current demand has become the greatest challenge among the 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 now emerging as an alternative technology to grow fodder for farm animals (Naik *et al*., 2011; Naik, 2012a; Naik *et al.,* 2013a; Naik *et al*., 2013b; Naik and Singh, 2013; Naik, 2014; Naik and Singh, 2014; and Naik *et al.,* 2015).

MATERIALS AND METHODS

Production of Hydroponic Yellow Maize Fodder

Hydroponic yellow maize fodder was produced in environmentally controlled hydroponic green fodder machine of 1 ton capacity purchased from Emaar farm technik, Mumbai. Good quality yellow maize seeds with less than 12% moisture were

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selected and weighed. Seeds were washed in tap water by stirring with wooden stick manually to remove chaffs and dirt. The seeds were then soaked in tap water for 20 hours. Water was then drained and the seeds were kept in gunny bags for 24 hours for germination. After germination, each type of seeds were weighed and placed onto 6 different trays and kept on the sprout section of hydroponic fodder machine. Each tray in the sprout section is provided with two drippers and one sprinkler which sprinkle water in every 3 hours for about 4 minutes. The trays were shifted to next rack daily. On the 5th day the tray enters the growth cycle in which each tray is supplied with two sprinklers. After 8 days of total growth period in the machine the fodder was taken out, weighed and analysed for nutritive value.

Proximate Analysis

Random samples were collected and proximate analysis of hydroponic maize fodder, yellow maize fodder and CO4 grass was done as per AOAC (2000).

Data Analysis

Data were analysed by one way ANOVA using GraphPad prism software.

RESULTS AND DISCUSSION

The word hydroponics has been derived from two Greek words hydro means 'water' and ponic means 'working'. Thus, fodder produced by growing plants in water or nutrient rich solution but without using any soil is known as hydroponics fodder or sprouted grains or sprouted fodder (Dung *et al.,* 2010a). Hydroponics is produced in greenhouses under controlled environment within a short period (Sneath and McIntosh, 2003). Hydroponics fodder is palatable and the germinated seeds embedded in the root system are also consumed along with the shoots of the plants without any nutrient wasting (Pandey and Pathak, 1991). Depending upon the type of grains, the hydroponics fodder looks like a mat of 11-30 cm height by the end of the germination period of about 8-days consisting of germinated seeds embedded in their white roots and green shoots (Snow *et al.,* 2008; Dung *et al.,* 2010b; Naik *et al.,* 2011; and Naik *et al.,* 2014a). Fresh yield of 3.5-6.0 folds in 7-8 days with DM content of 10.3-18.5% in maize fodder has been reported (Naik, 2014a; and Sneath and McIntosh, 2003). However 4.6 folds fresh yield of maize fodder was observed during our experiment.

Nutritive values of hydroponic yellow maize fodder and conventional fodders were compared in Table 1. From the table it is understood that, hydroponic yellow maize fodder has significantly higher moisture (76.75%), CP (10.55%), EE (4.62%) and NFE (77.52%) content and significantly lower CF (5.51%) and TA (1.80%) than CO_4 grass and land grown yellow maize fodder.

Naik *et al.* (2012b) also reported higher CP, EE and NFE; and lower CF and TA percentage in hydroponics maize fodder than the conventional maize fodder. The increase in CP content may be attributed to the loss in DM, particularly carbohydrates, through respiration during germination and thus longer sprouting time is responsible for greater losses in DM and increase in protein content. Besides, the absorption of nitrates facilitates the metabolism of nitrogenous compounds and thus increases the CP levels (Naik *et al.,* 2015). The nutrient contents of hydroponics fodder are superior to certain common non-leguminous fodders but comparable to leguminous fodders (Pandey and Pathak, 1991; and Naik *et al.,* 2012a) in terms of available OM, CP, EE and NFE content.

Table 1: Comparison of Hydroponic Yellow Maize Fodder and Conventional Green Fodders

S. No.	Type of Fodder	Growth Period (Days)	Moisture %	% Dry Matter Basis				
				CP	CF	EE	TA	NFE
1	Hydroponic yellow maize fodder	8	76.75^{NS}	10.55^{b}	5.51^{a}	4.62^{b}	1.80^{a}	77.52^{c}
2	Yellow maize fodder (Soil grown)	60	73.56^{NS}	5.85^{a}	24.71^{b}	1.92^{a}	7.58^{b}	59.67^{b}
3	CO4 grass fodder	45	75.88^{NS}	7.73^{a}	27.71^{c}	2.25^{ab}	13.99^{c}	48.32^{c}

Note: Means bearing same superscript in the same column do not differ significantly ($P > 0.01$); Means bearing different superscript in the same column differ significantly at ($P < 0.05$).

CONCLUSION

Thus it is concluded that the hydroponic yellow maize fodder is superior to conventional green fodders like CO4 grass and yellow maize fodder in terms of nutritive value with additional advantage of minimal growth period.

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