

NUTRIENT CHANGES WITH THE GROWTH OF HYDROPONICS WHEAT FODDER

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Abstract: A study was conducted to evaluate the nutrient changes during growth of hydroponics fodder wheat. The seeds were soaked from 1st day to 8th day. An increasing trend was seen in protein content of hydroponics wheat fodder and it was highest on 8th day (15.75%), which was higher than conventional green fodder wheat (11.02%). The ether extract content of hydroponics fodder wheat was highest on 8th day (2.80%). The crude fiber content of the wheat seed was 2.40% and increased upto 5.20% on 8th day of growth. The crude fibre content in hydroponics system was much lower than the conventional fodder. The total ash content of the hydroponics fodder wheat was 3.00% on 8th day, which was lower than ($P<0.01$) than conventional fodder (8.28%). The nitrogen free extract content of the wheat seed decreased to (73.25%) on 8th day of growth as compared to seed (83.40%), however it was more than conventional cereal fodders. It was concluded that the hydroponics wheat fodder was more nutritious than the conventional cereal fodders.

Keywords: Hydroponics Wheat, Fodder, Nutrient.

Introduction

Supplementation of hydroponics sprouts in the rations of dairy animals is coming up as a viable alternate technology for the livestock farmers due to lesser availability of green fodders (Naik *et al.*, 2016). As an alternative solution to conventional method, fodders can be grown with hydroponics technology within a week. During the growth of the hydroponics fodder, a lot of changes occur in the fodder seed while transforming into the fodder plant. In majority of cases maize is being utilized for the production of hydroponics, however due to higher protein content of wheat grains, efforts have been made to evaluate wheat nutritionally as a hydroponics fodder.

Materials and Methods

Samples of hydroponics fodder wheat (*Triticum aestivum*) were grown by Ayurved Pro-green, Hydroponic Machine, at Cattle Breeding Farm, Nagpur Veterinary College, Nagpur. Hydroponics chamber equipped with automatic sprayer irrigation of tap water, micro

sprinkler used in frequent intervals. Clean seeds of wheat were soaked in tap water individually for 7 hrs. Then, soaked seed packed into cotton cloth for several hrs. Then seeds were strained and spread in the greenhouse trays. “MP” Wheat variety was used to grow fodder inside the Ayurvet Pro-Green by hydroponics technology in seven days. The approximate plant height on 8th day was >15 cm getting 6-7 kg fodder from 1kg wheat seed within 8 days by using hydroponic method. The samples were analyzed each day for the nutrients content viz. crude protein (CP), ether extract (EE), crude fiber (CF), total ash (TA), nitrogen free extract(NFE) as per AOAC (2000). The data were analyzed statistically as per Snedecor and Cochran (1994).

Table 1: Chemical composition (% DM basis) of hydroponics wheat fodder

Wheat	Moisture	Crude protein**	Ether extract*	Crude fibre**	Ash	NFE**	Fresh yield** (kg)
Seed	8.20 ±0.26	10.00 ^a ±0.06	1.80 ^a ±0.10	2.40 ^a ±0.12	2.40 ±0.09	83.40 ^g ±0.26	
Day 1	48.60 ±1.12	10.05 ^a ±0.29	1.90 ^{ab} ±0.10	2.80 ^b ±0.09	2.42 ±0.06	82.83 ^{fg} ±0.26	3.56 ^a ±0.09
Day 2	52.76 ±0.96	10.75 ^a ±0.14	2.00 ^{bc} ±0.06	2.91 ^b ±0.09	2.44 ±0.06	81.90 ^f ±0.14	3.88 ^a ±0.06
Day 3	67.00 ±2.14	12.20 ^b ±0.72	2.13 ^{cd} ±0.09	3.00 ^b ±0.17	2.50 ±0.10	80.17 ^e ±0.29	4.26 ^b ±0.09
Day 4	70.56 ±1.28	12.25 ^b ±0.36	2.24 ^d ±0.16	3.17 ^c ±0.11	2.53 ±0.09	79.81 ^e ±0.26	5.09 ^c ±0.09
Day 5	82.38 ±4.44	13.12 ^c ±0.12	2.41 ^e ±0.06	3.50 ^c ±0.12	2.61 ±0.12	78.36 ^d ±0.12	5.67 ^d ±0.11
Day 6	83.29 ±0.52	14.07 ^d ±0.26	2.59 ^f ±0.12	4.20 ^d ±0.16	2.67 ±0.12	76.47 ^c ±0.19	6.40 ^e ±0.14
Day 7	86.36 ±1.26	15.03 ^e ±0.38	2.72 ^g ±0.12	4.70 ^e ±0.09	2.88 ±0.09	74.67 ^b ±0.11	7.10 ^f ±0.12
Day 8	87.66 ±1.26	15.75 ^e ±0.44	2.80 ^g ±0.09	5.20 ^f ±0.11	3.00 ±0.09	73.25 ^a ±0.26	7.12 ^f ±0.26
Wheat Fodder	72.26 ±3.14	11.02 ±0.32	2.02 ±0.06	24.71 ±0.13	8.28 ±0.12	52.97 ±0.44	

*Means bearing abc differs significantly ** (P<0.01), * (P<0.05)*

Results and Discussion

The significant differences were noted in the nutrients content of hydroponics fodder wheat during different stages of growth and wheat grown in conventional practices (Table 1). The CP content of the wheat seed was 10 percent, which was comparable up to 2nd day of growth in hydroponics system. The CP content of the sprouted wheat showed an increasing

trend with germination time and was highest on 8th day as 15.75 percent. The increase in protein content may be attributed to the loss in dry weight, particularly carbohydrates, through respiration during germination and thus longer sprouting time was responsible for the greater losses in dry weight and increasing trend in protein content (Dung *et al.* 2010). The absorption of nitrates facilitates the metabolism of nitrogenous compounds from carbohydrates reserves, thus increasing levels of CP (Sneath and McIntosh, 2003). The CP content of hydroponics wheat in the present study was more than hydroponics reported by Naik *et al.* (2016). The fresh yield of hydroponics fodder was increased as the day of sprouting advances with the decreased DM content of fodder. The increase in fresh weight and decrease in DM content during sprouting of seeds could be due to the inhibition of water and enzymatic activities, respectively. The inhibition of water and enzymatic activities depletes the food reserves of the seed endosperm without any adequate replenishment from photosynthesis by the young plant and thus provides little chance for DM accumulation during short growing cycle (Sneath and McIntosh, 2003). The EE content of fodder maize on 8th day (2.80 percent) was highest at different stages of growth under hydroponics system and under conventional practices, which might be due to the high chlorophyll content at that particular stage, which was extracted completely and determined as EE. The CF content of hydroponics fodder wheat seed was 2.40 percent and increased up to 5.20 percent on 8th day of growth. The increase in CF content during sprouting of wheat might be due to the synthesis of structural carbohydrates such as cellulose and hemicelluloses (Chung *et al.* 1989). The NFE content of seed decreased to its maximum level on 8th day (73.25 percent) in hydroponics system and was higher to the wheat fodder grown under conventional system. It was concluded that the hydroponics wheat fodder was more nutritious than the conventional cereal fodders.

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